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July 1984
Final Report

DOT HS-806 668



US Department
of Transportation
**National Highway
Traffic Safety
Administration**

BUMPER TESTS OF A 1979 FORD LTD RETROFITTED
WITH ROMEO-KOJYO AND BREED ALL MECHANICAL
AIR BAG SENSOR SYSTEMS

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16. Abstract This test report documents the three bumper tests conducted on a 1979 Ford LTD 4-door Sedan. Testing was conducted on June 8, 1984 and June 11, 1984. The purpose of the tests was to evaluate firing velocity levels of a retrofitted Romeo-Kojyo air bag sensor system and a Breed All Mechanical air bag sensor system. The test velocities were 5.1 mph, 7.1 mph and 9.1 mph.					
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SECTION 1.0
PURPOSE AND INTRODUCTION

PURPOSE

The purpose of conducting three bumper tests was to evaluate the velocity levels at which Romeo-Kojyo air bag sensors would fire when the vehicle was equipped with a pusher bar on the front bumper as used by various state police department vehicles which are being retrofitted with Romeo-Kojyo airbag systems. In addition, the vehicle was fitted with a prototype Breed Corporation mechanical airbag system firing mechanism which was undergoing preliminary testing at the time. The vehicle was tested using conditions not currently contained in a Federal Motor Vehicle Safety Standard.

INTRODUCTION

A 1979 Ford LTD 4-door sedan was towed into a fixed rigid barrier twice on June 8, 1984 and once on June 11, 1984 at velocities of 5.1 mph, 9.1 mph and 7.1 mph respectively. The tests were conducted to determine at what velocity levels the Romeo-Koyjo airbag system and its attendant sensors would fire. A Breed Corporation All Mechanical Air Bag System sensor was also monitored for firing signals.

The test vehicle contained no anthropomorphic dummies. Photographic coverage consisted of two (2) high speed 16mm motion picture films and still coverage. The purpose of the high speed film was to document the firing or non-firing of a flash bulb wired so it would light only if both the right front sensor and the safety sensor of the Romeo-Kojyo system were fired simultaneously. Other Romeo-Kojyo sensors on the vehicle which were monitored were the left front sensor and a special high level prototype sensor. The firing of the Breed System sensor was monitored by a single switch. The following table summarizes the firing of each system for the three tests.

TEST	BREED	ROMEO-KOJYO			
<u>SPEED (MPH)</u>	<u>SENSOR</u>	<u>RT. FRONT</u>	<u>SAFE</u>	<u>LEFT FRONT</u>	<u>HIGH</u>
5.1	No	No	Yes	No	No
7.1	No	Yes	Yes	Yes	Yes
9.1	Yes	Yes	Yes	Yes	Yes

Section 2 contains General Test and Vehicle Parameter Data. Section 3 contains applicable data required by R & D. Appendix A contain pre-test and post-test vehicle photographs. Appendix B contains Data Plots.

SECTION 2.0
GENERAL TEST AND VEHICLE PARAMETER DATA

The following data sheets describe the General Test and Vehicle Parameter Data.

TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Ford Motor Company of Canada Ltd.

MAKE/MODEL: Ford LTD

VIN: FOB63F103382F

BODY STYLE: 4-Door Sedan

MODEL YEAR: 1979

NHTSA NO.: R & D

COLOR: Burgundy

ENGINE DATA: TYPE: V8

CYLINDERS: 8

DISPLACEMENT 302 CID

TRANSMISSION DATA: 3-Speed Automatic

DATE VEHICLE RECEIVED: 5/31/84

ODOMETER READING: 86142

DEALER'S NAME AND ADDRESS: NA

ACCESSORIES:

POWER STEERING	Yes	AUTOMATIC TRANSMISSION	Yes
POWER BRAKES	Yes	AUTOMATIC SPEED CONTROL	No
POWER SEATS	No	TILTING STEERING WHEEL	No
POWER WINDOWS	No	TELESCOPING STEERING WHEEL	No
TINTED GLASS	Yes	AIR CONDITIONING	Yes
RADIO	Yes	ANTI-SKID BRAKE	No
CLOCK	No	REAR WINDOW DEFROSTER	No
OTHER			

REMARKS:

1. IS THE VEHICLE STOCK THROUGHOUT? Yes
2. DOES VEHICLE SHOW EVIDENCE OF PRIOR ACCIDENT HISTORY? No
3. DOES VEHICLE SHOW ANY SIGNIFICANT CORROSION? No
4. CONDITION OF THE FRONT/REAR BUMPER AND FRAME: Good

DATA FROM CERTIFICATION LABEL ON LEFT DOOR FACE OR "B" POST:

VEHICLE MANUFACTURED BY: Ford Motor Company of Canada Ltd.

DATE OF MANUFACTURE: 9/79

GVWR: 5333 LBS.

GAWR: FRONT 2719 LBS.; REAR 2664 LBS.

VEHICLE TIRE DATA

RECOMMENDED COLD TIRE PRESSURE: FRONT 31 psi; REAR 35 psi

TIRES ON VEHICLE (MFGR. & LINE, SIZE): Tiempo Goodyear P205/75 R 14

BIAS PLY, BELTED, OR RADIAL: Radial

PLY RATING: 4

IS SPARE TIRE "SPACE SAVER"? No

IS SPARE TIRE STANDARD EQUIPMENT? No

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND LBS. CARGO:

RIGHT FRONT	1130	LBS.	RIGHT REAR	780	LBS.
LEFT FRONT	1130	LBS.	LEFT REAR	750	LBS.
TOTAL FRONT WEIGHT	2260		LBS. (59.6 % OF TOTAL VEHICLE WEIGHT)		
TOTAL REAR WEIGHT	1530		LBS. (40.4 % OF TOTAL VEHICLE WEIGHT)		
TOTAL TEST WEIGHT	3790		LBS.		

WEIGHT OF BALLAST SECURED IN VEHICLE TRUNK AREA: 0 LBS.

TEST CONDITIONS

TEST NUMBER: 840608A

DATE OF TEST: 6/8/84

TIME OF TEST: 11:20

AMBIENT TEMPERATURE AT IMPACT AREA:

80°F

SUBJECT VEHICLE DATA

	<u>ACTUAL</u>	<u>INTENDED</u>
TEST WEIGHT (LBS.)	3790	DNA
VEHICLE VELOCITY (mph)	5.1	5

VEHICLE ATTITUDE (ALL DIMENSIONS IN INCHES):

DELIVERED ATTITUDE:	RF 26 7/16	;LF 25 5/8	;RR 27 5/8	;LR 26 15/16
PRE-TEST ATTITUDE:	RF 26 11/16	;LF 26 5/16	;RR 26 3/4	;LR 26 15/16
POST-TEST ATTITUDE:	RF 26 11/16	;LF 26 5/16	;RR 26 13/16	;LR 26 15/16

BUMPER STROKE (ALL DIMENSIONS IN INCHES):

LEFT BUMPER STROKE: 1/16

RIGHT BUMPER STROKE: 1/16

TEST CONDITIONS

TEST NUMBER: 840608B

DATE OF TEST: 6/8/84

TIME OF TEST: 13:00

AMBIENT TEMPERATURE AT IMPACT AREA:

80°F

SUBJECT VEHICLE DATA

	<u>ACTUAL</u>	<u>INTENDED</u>
TEST WEIGHT (LBS.)	3790	DNA
VEHICLE VELOCITY (mph)	9.1	9

VEHICLE ATTITUDE (ALL DIMENSIONS IN INCHES):

DELIVERED ATTITUDE:	RF 26 7/16	;LF 25 5/8	;RR 27 5/8	;LR 26 15/16
PRE-TEST ATTITUDE:	RF 26 11/16	;LF 26 5/16	;RR 26 3/4	;LR 26 15/16
POST-TEST ATTITUDE:	RF 26 5/8	;LF 26 1/8	;RR 27 1/16	;LR 26 3/4

BUMPER STROKE (ALL DIMENSIONS IN INCHES):

LEFT BUMPER STROKE: 1 5/16

RIGHT BUMPER STROKE: 2

TEST CONDITIONS

TEST NUMBER: 840611

DATE OF TEST: 6/11/84

TIME OF TEST: 14:50

AMBIENT TEMPERATURE AT IMPACT AREA:

80°F

SUBJECT VEHICLE DATA

	<u>ACTUAL</u>	<u>INTENDED</u>
TEST WEIGHT (LBS.)	3790	DNA
VEHICLE VELOCITY (mph)	7.1	7

VEHICLE ATTITUDE (ALL DIMENSIONS IN INCHES):

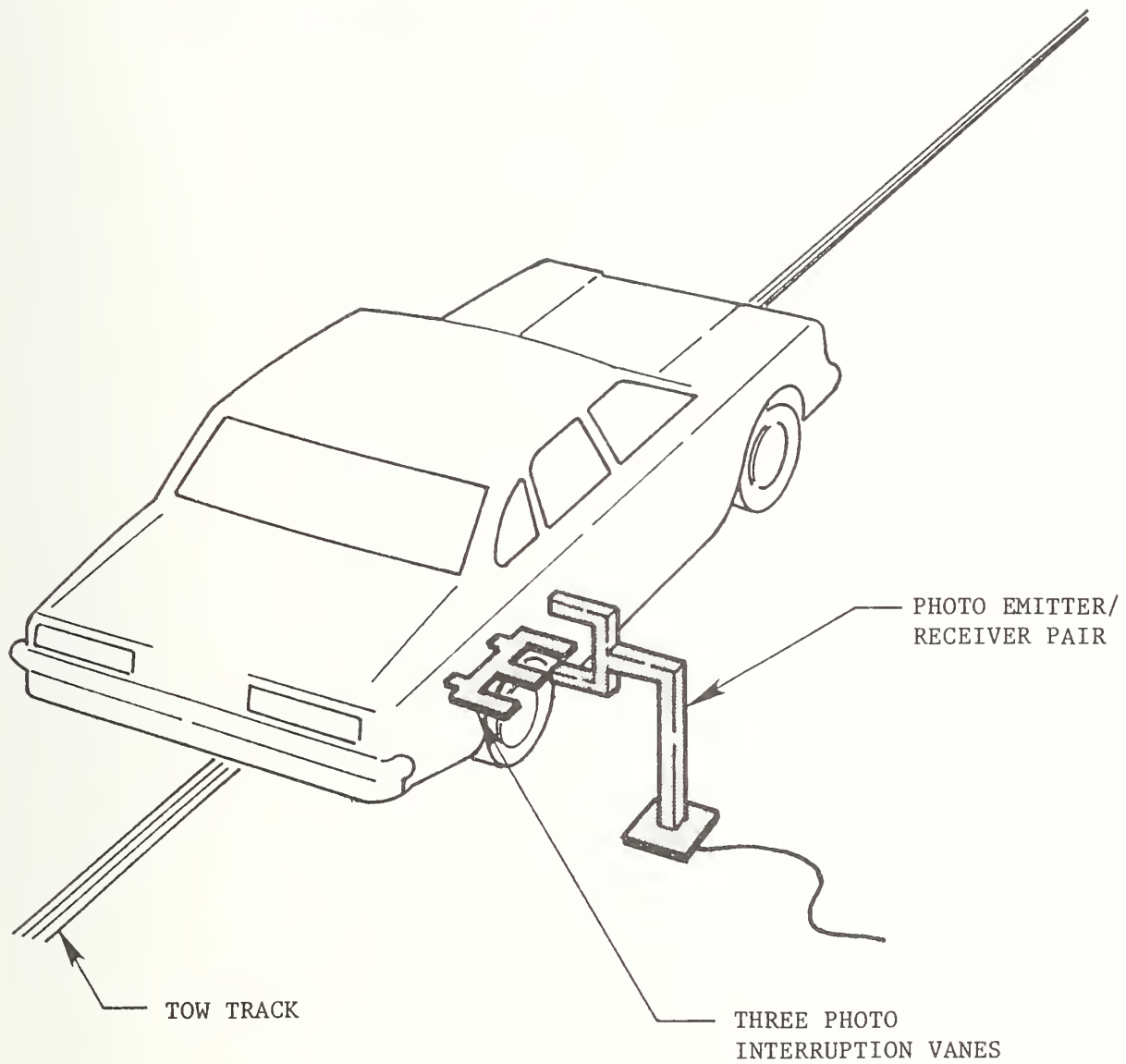
DELIVERED ATTITUDE:	RF 26 7/16	;LF 25 5/8	;RR 27 5/8	;LR 26 15/16
PRE-TEST ATTITUDE:	RF 26 5/16	;LF 25 7/8	;RR 27 1/4	;LR 27 3/16
POST-TEST ATTITUDE:	RF 26 5/16	;LF 25 15/16	;RR 26 13/16	;LR 26 15/16

BUMPER STROKE (ALL DIMENSIONS IN INCHES):

LEFT BUMPER STROKE: 3 3/16

RIGHT BUMPER STROKE: 3 1/16

IMPACT VELOCITY MEASUREMENT SYSTEM



The final vane is located two inches before impact.

The vanes have one foot spacing.

SECTION 3.0
DATA REQUIRED BY R&D

The following pages are included in this section:

1. Vehicle accelerometer data summary
2. High speed camera information

VEHICLE ACCELEROMETER TEST NO. 840608A (5.1 MPH) DATA SUMMARY

NO.	LOCATION	POSITIVE DIRECTION		NEGATIVE DIRECTION	
		MAX (g)	TIME (msec)	MAX (g)	TIME (msec)
1	LEFT FRONT CROSSMEMBER (LONGITUDINAL)	3.09	166.88	9.23	38.75
2	RIGHT FRONT CROSSMEMBER (LONGITUDINAL) $\Delta V = -5.2 \text{ mph @ } 143.38 \text{ msec}$	1.36	22.75	10.43	13.00
3	LOWER STEERING COLUMN (LONGITUDINAL) $\Delta V = -5.8 \text{ mph @ } 107.63 \text{ msec}$ (VERTICAL) $\Delta V = 5.1 \text{ mph @ } 0.00 \text{ msec}$	0.75 0.93	118.75 181.63	6.84 5.58	37.50 39.38
4	UPPER STEERING COLUMN (LONGITUDINAL) $\Delta V = -5.7 \text{ mph @ } 105.50 \text{ msec}$ (VERTICAL) $\Delta V = 7.6 \text{ mph @ } 56.63 \text{ msec}$	0.96 5.32	155.50 80.63	6.55 5.96	37.63 46.38
5	LEFT B-PILLAR (LONGITUDINAL)	0.52	186.63	6.87	36.25

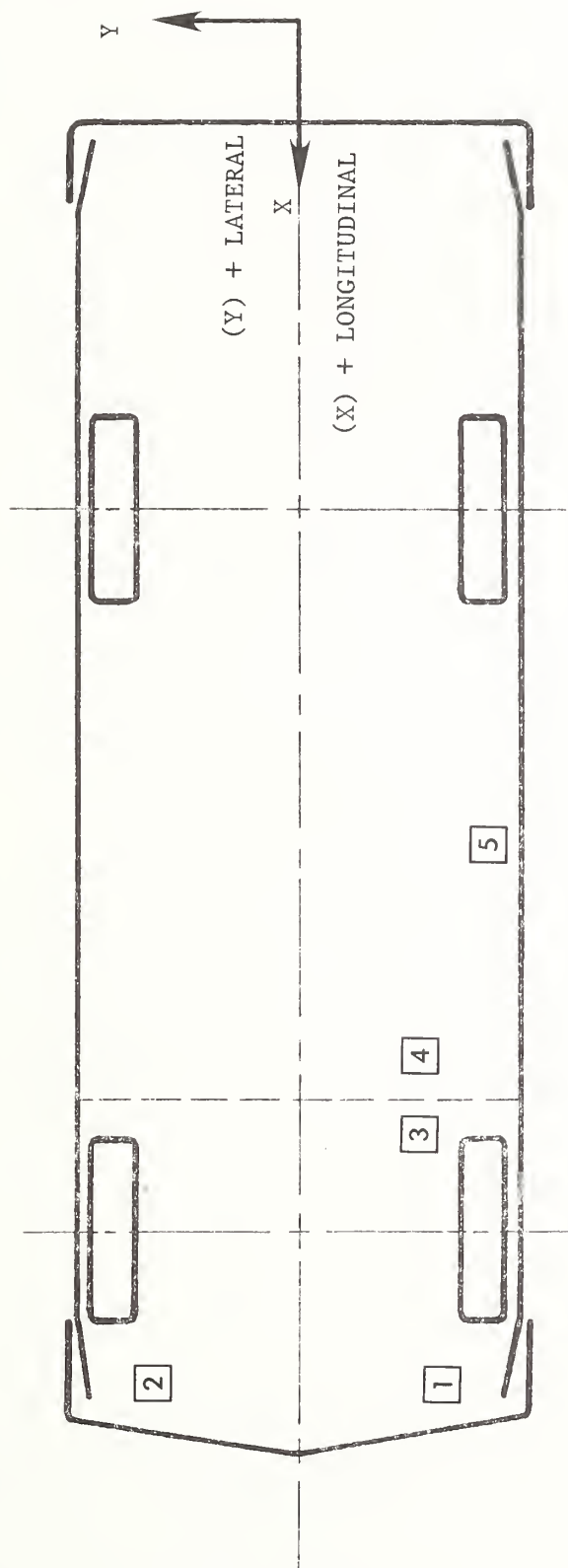
VEHICLE ACCELEROMETER TEST NO. 840608B (9.1 MPH) DATA SUMMARY

NO.	LOCATION	POSITIVE DIRECTION		NEGATIVE DIRECTION	
		MAX (g)	TIME (msec)	MAX (g)	TIME (msec)
1	LEFT FRONT CROSSMEMBER (LONGITUDINAL)	2.08	110.63	19.25	59.63
2	RIGHT FRONT CROSSMEMBER (LONGITUDINAL) $\Delta V = -9.5$ mph @ 145.63 msec	3.56	32.00	24.39	37.75
3	LOWER STEERING COLUMN (LONGITUDINAL) $\Delta V = -10.7$ mph @ 105.88 msec (VERTICAL) $\Delta V = 9.1$ mph @ 0.00 msec	1.01 3.97	133.63 85.25	11.44 7.16	46.00 45.63
4	UPPER STEERING COLUMN (LONGITUDINAL) $\Delta V = -10.9$ mph @ 106.50 msec (VERTICAL) $\Delta V = 13.5$ mph @ 180.25 msec	1.14 5.32	187.63 88.00	11.51 10.39	44.63 51.13
5	LEFT B-PILLAR (LONGITUDINAL)	0.91	181.38	11.85	52.00

VEHICLE ACCELEROMETER TEST NO. 840611 (7.1 MPH) DATA SUMMARY

NO.	LOCATION	POSITIVE DIRECTION		NEGATIVE DIRECTION	
		MAX (g)	TIME (msec)	MAX (g)	TIME (msec)
1	LEFT FRONT CROSSMEMBER (LONGITUDINAL)	3.78	27.88	15.85	20.00
2	RIGHT FRONT CROSSMEMBER (LONGITUDINAL) $\Delta V = -8.9$ mph @ 109.75 msec	1.74	146.50	10.57	35.88
3	LOWER STEERING COLUMN (LONGITUDINAL) $\Delta V = 7.1$ mph @ 1.88 msec (VERTICAL) $\Delta V = 10.5$ mph @ 186.75 msec	1.09 1.51	146.25 105.25	8.86 5.98	44.38 46.25
4	UPPER STEERING COLUMN (LONGITUDINAL) $\Delta V = 7.1$ mph @ 0.00 msec (VERTICAL) $\Delta V = 10.3$ mph @ 194.00 msec	1.04 2.62	146.00 85.13	8.60 7.46	44.50 51.75
5	LEFT B-PILLAR (LONGITUDINAL)	1.19	130.88	9.50	55.25

VEHICLE ACCELEROMETER LOCATIONS



HIGH SPEED CAMERA INFORMATION

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)	PURPOSE OF CAMERA DATA
1	Driver's Side	Photosonic 1B	25	500	Bumper Stroke
2	Driver's Side	Photosonic 1B	50	500	Bumper Stroke

TEST NOS.: 840608A, 840608B and 840611

APPENDIX A
PHOTOGRAPHS



Figure A-1. BREED SENSOR LOCATION



Figure A-2. LOWER STEERING COLUMN ACCELEROMETER LOCATION



Figure A-3. VEHICLE INTERIOR SYSTEM

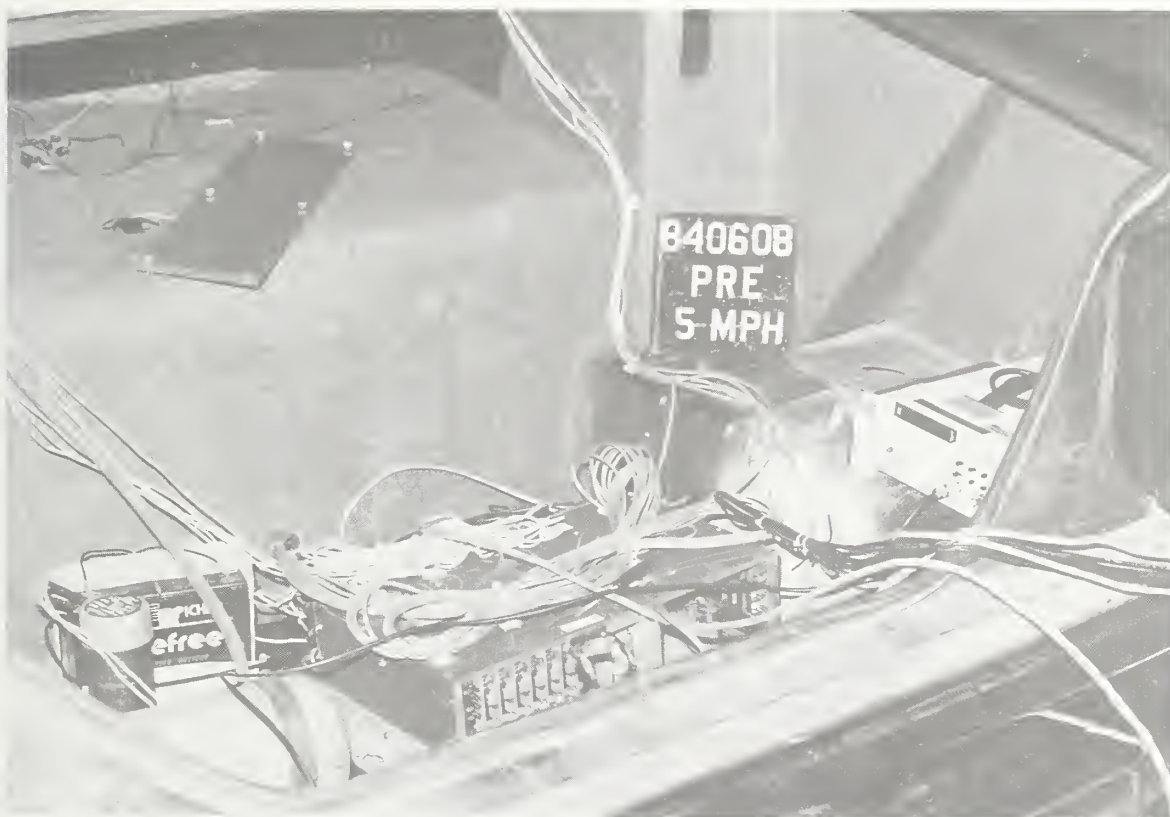


Figure A-4. DATA ACQUISITION SYSTEM



Figure A-5. TESTS 840608A AND 840608B PRE-TEST - VIEW 1



Figure A-6. TESTS 840608A AND 840608B PRE-TEST - VIEW 2

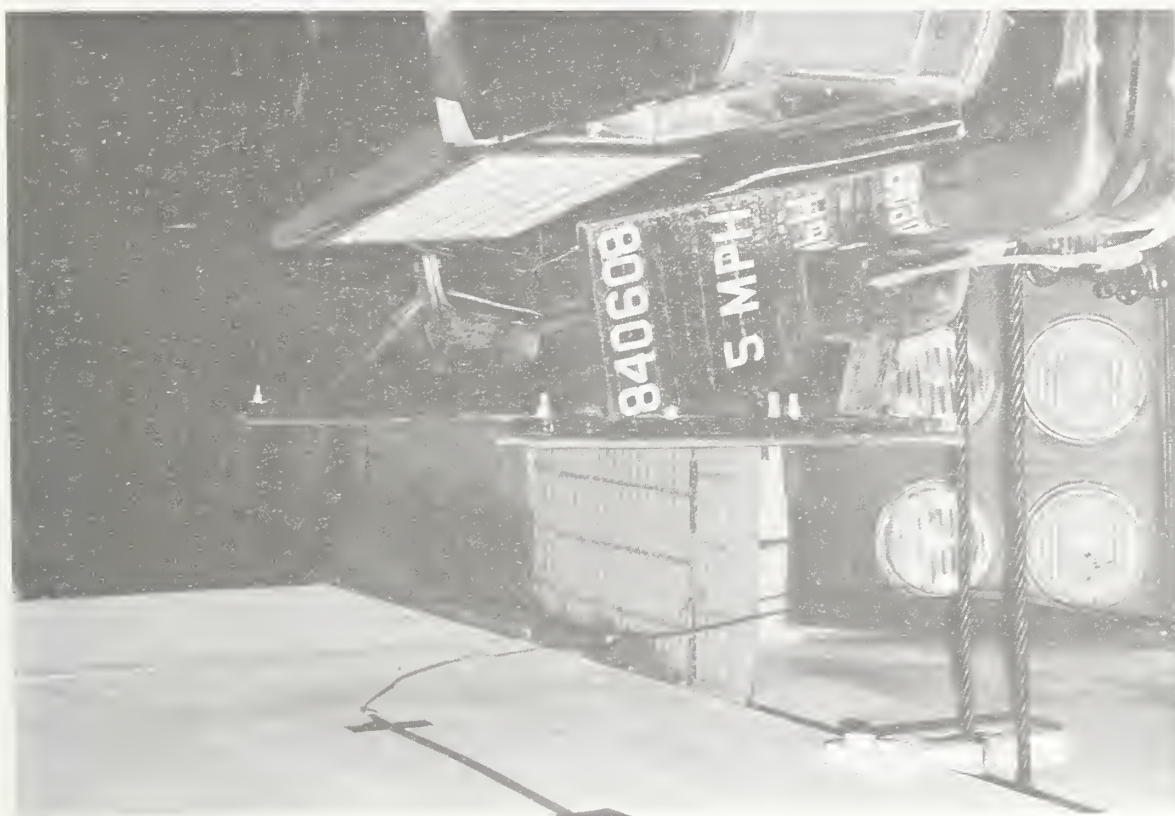


Figure A-7. TEST 840608A POST-TEST - VIEW 1

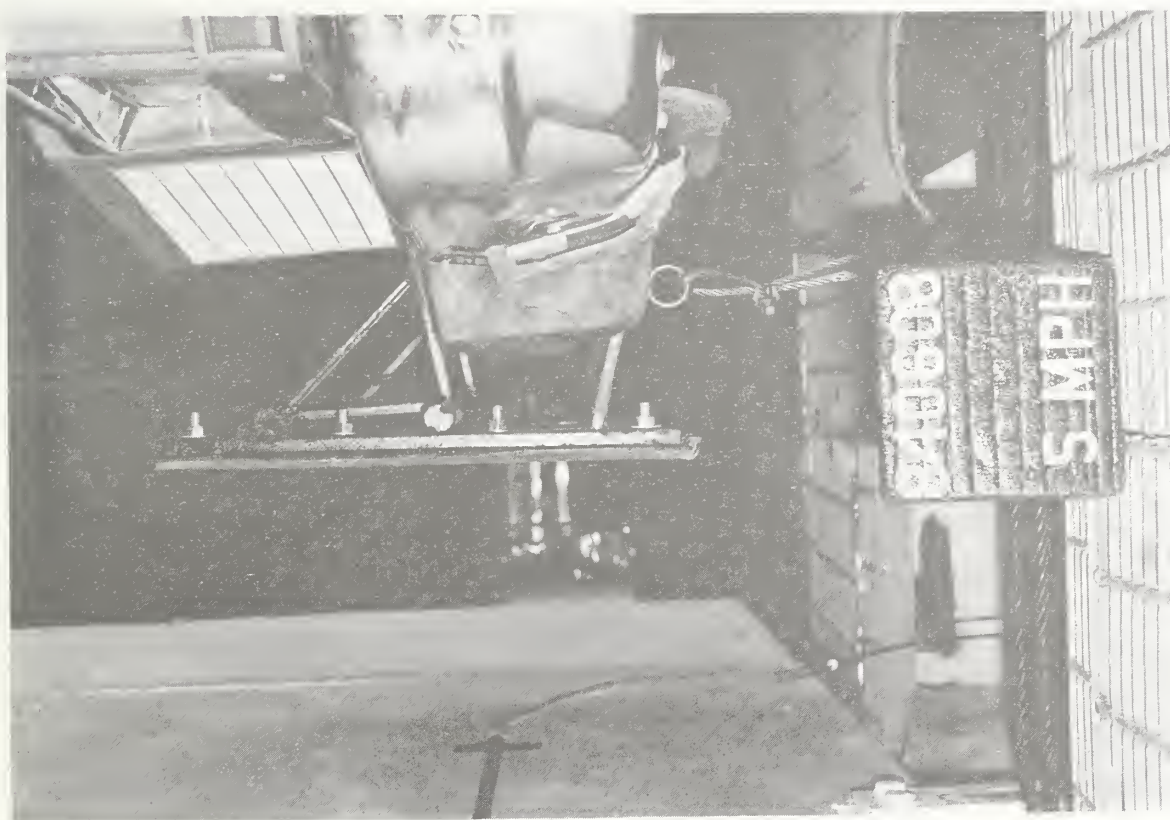


Figure A-8. TEST 840608A POST-TEST - VIEW 2

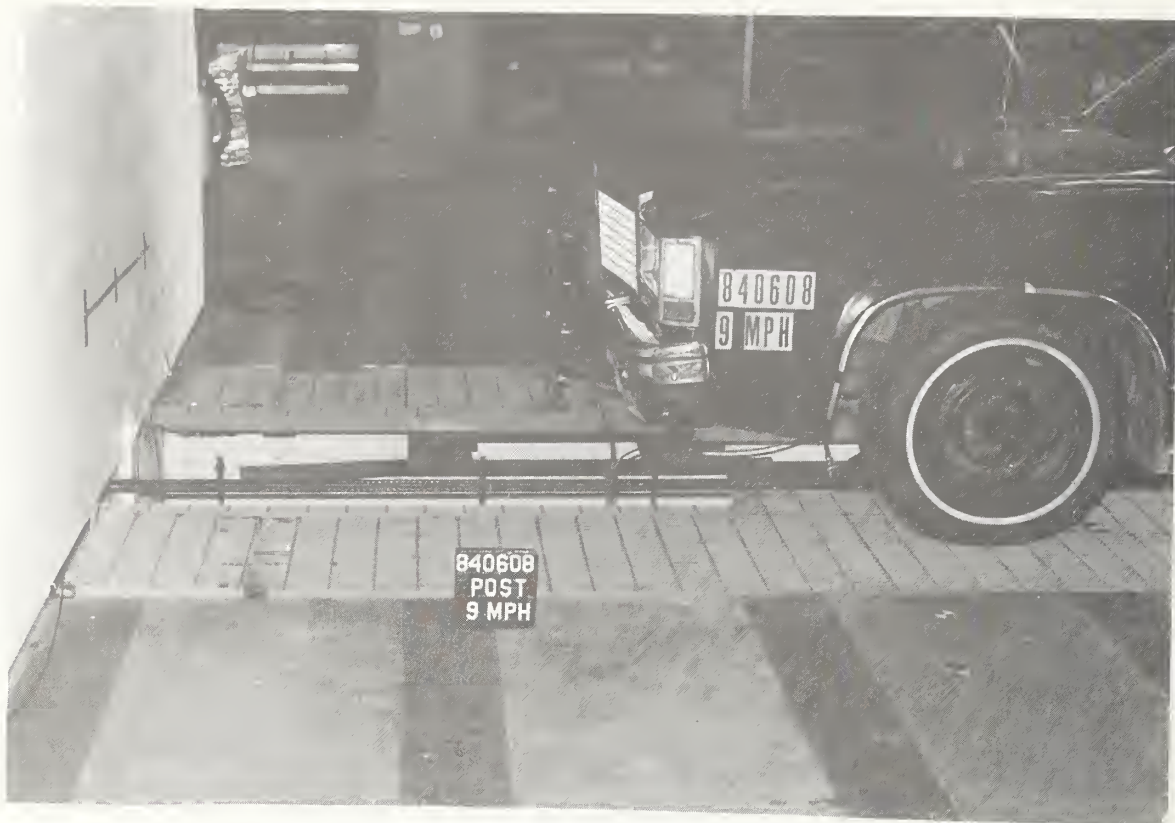


Figure A-9. TEST 840608B POST-TEST - VIEW 1

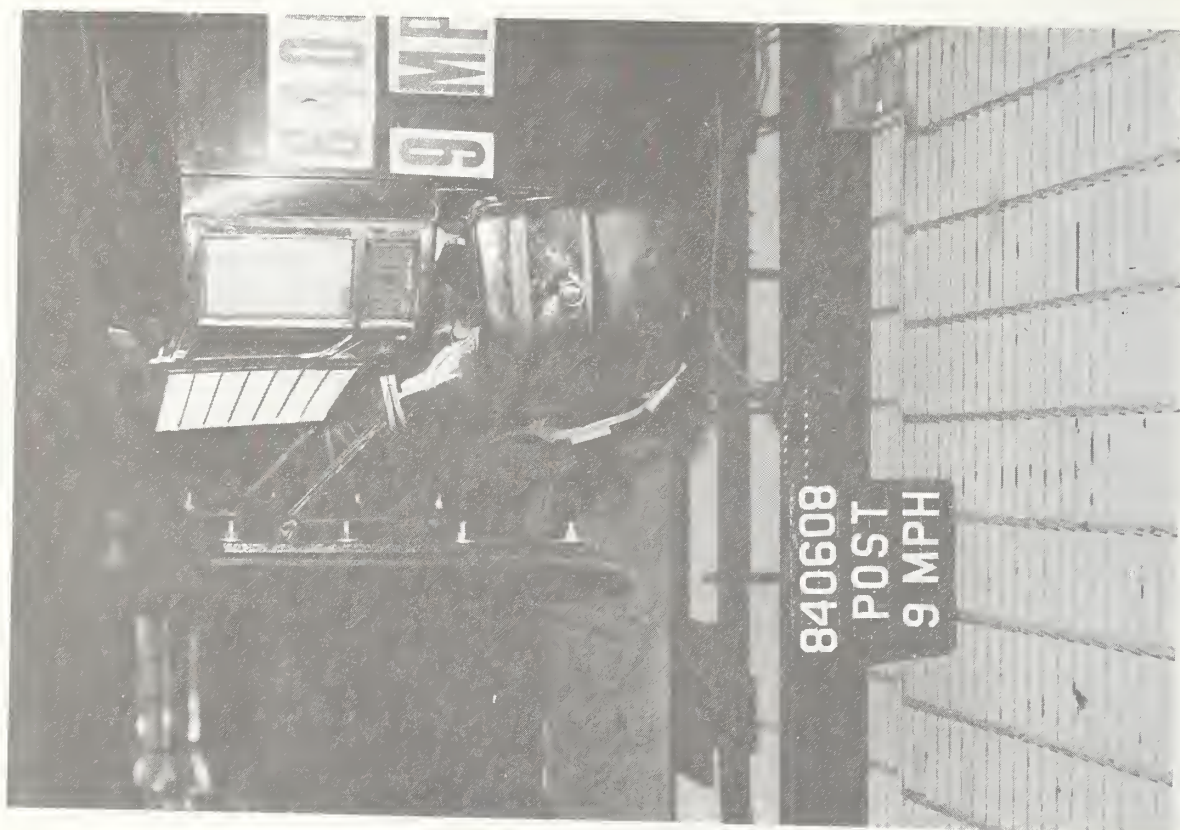


Figure A-10. TEST 840608B POST-TEST - VIEW 2



Figure A-11. TEST 840608B POST-TEST - VIEW 3



Figure A-12. TEST 840608B VEHICLE DAMAGE - VIEW 1



Figure A-13. TEST 840608B VEHICLE DAMAGE - VIEW 2

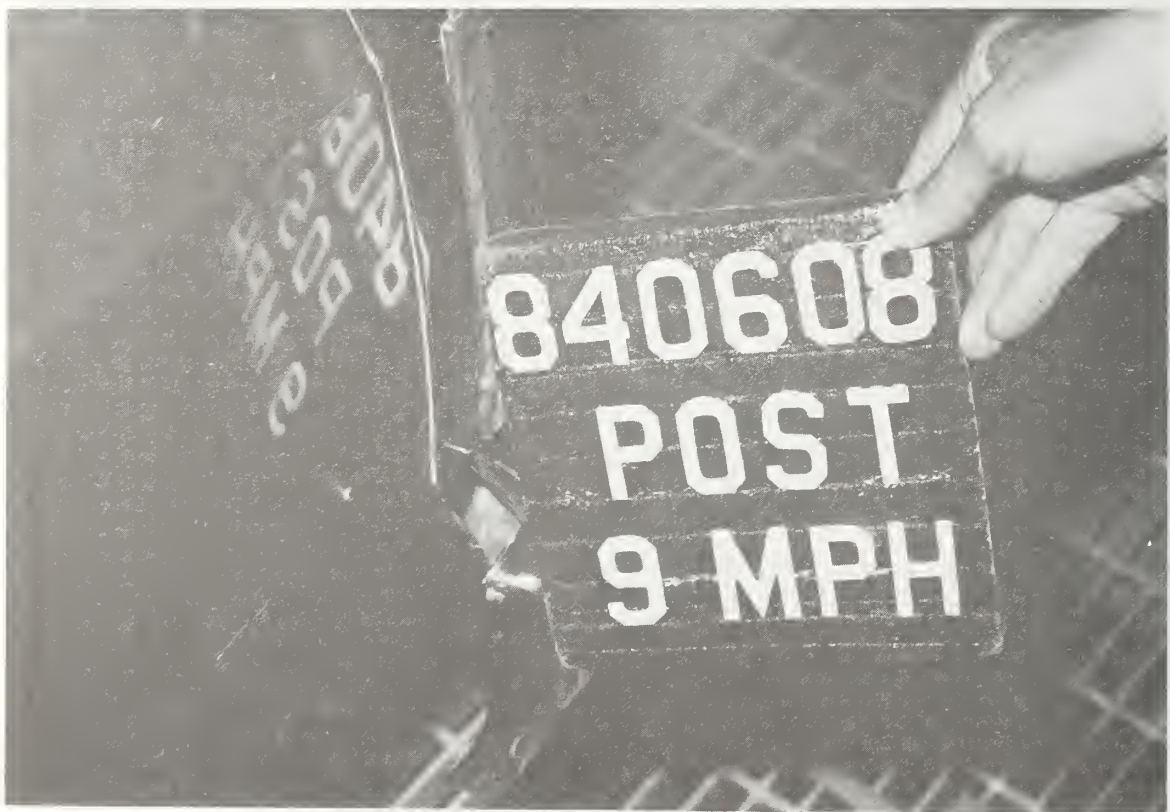


Figure A-14. TEST 840608B VEHICLE DAMAGE - VIEW 3



Figure A-15. TEST 840608B VEHICLE DAMAGE - VIEW 4



Figure A-16. TEST 840608B VEHICLE DAMAGE - VIEW 5

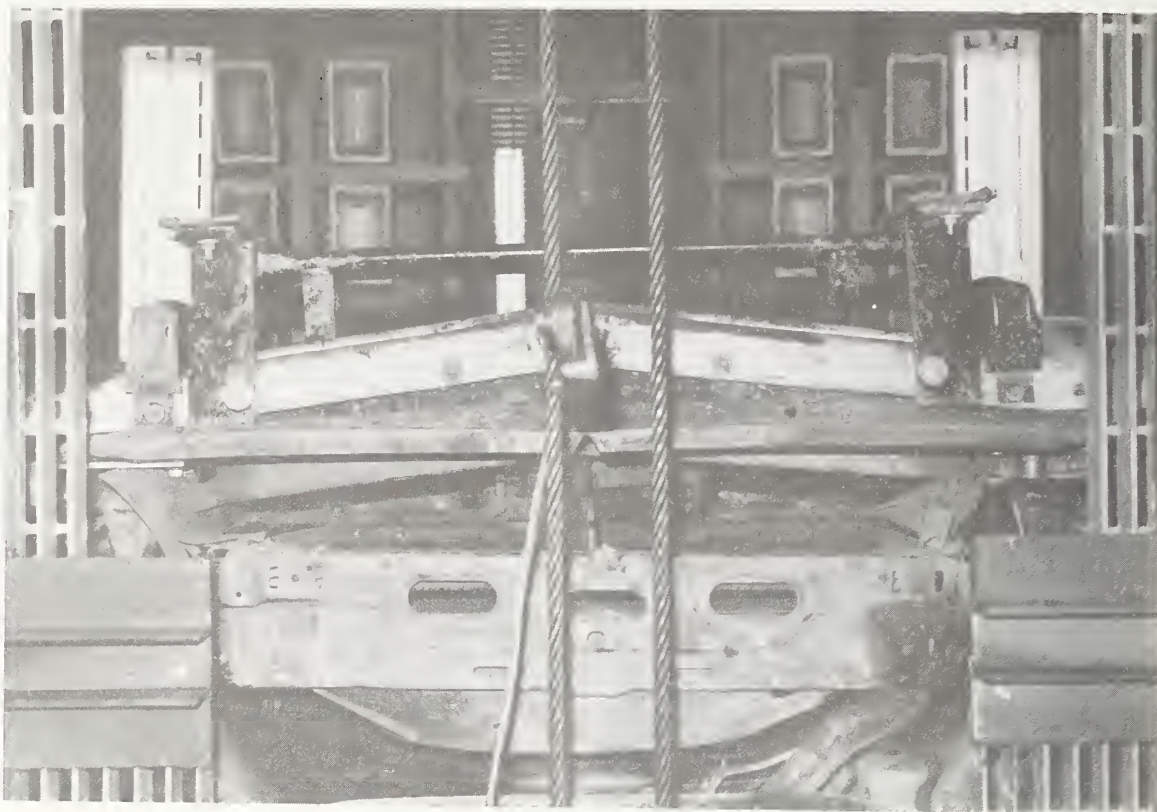


Figure A-17. TEST 840608B VEHICLE DAMAGE - VIEW 6

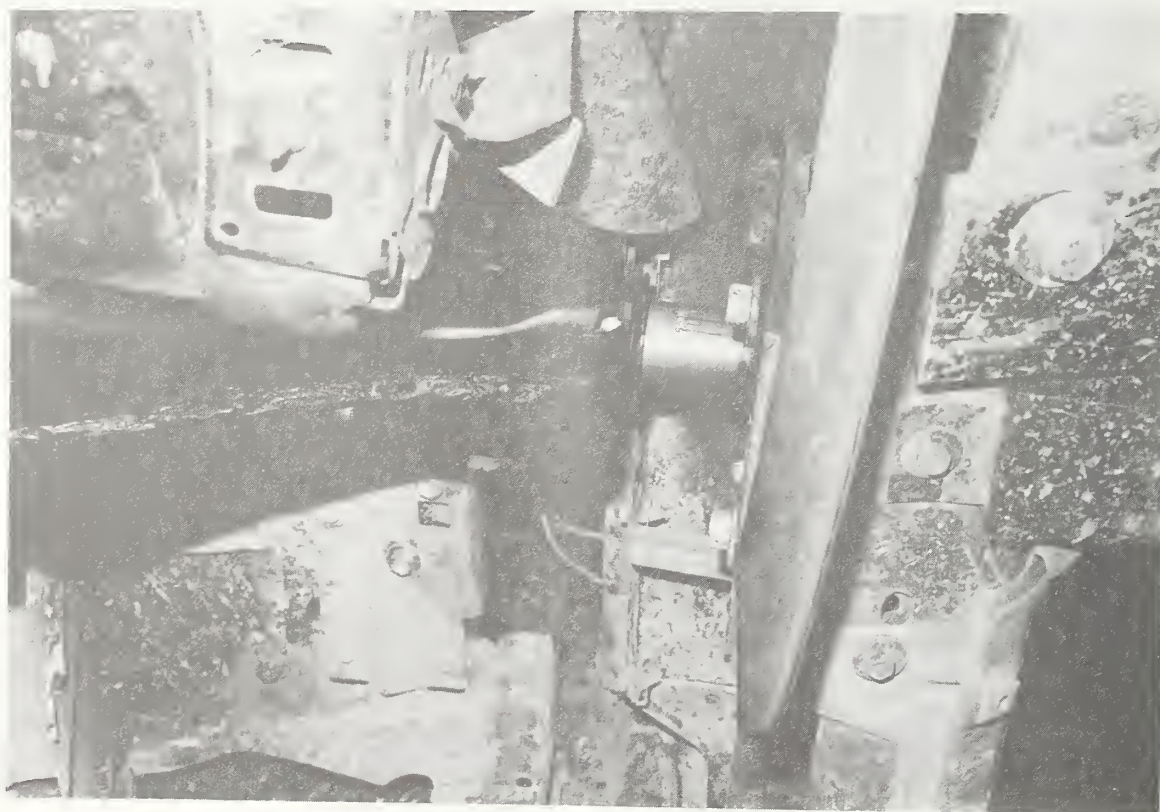


Figure A-18. TEST 840608B VEHICLE DAMAGE - VIEW 7

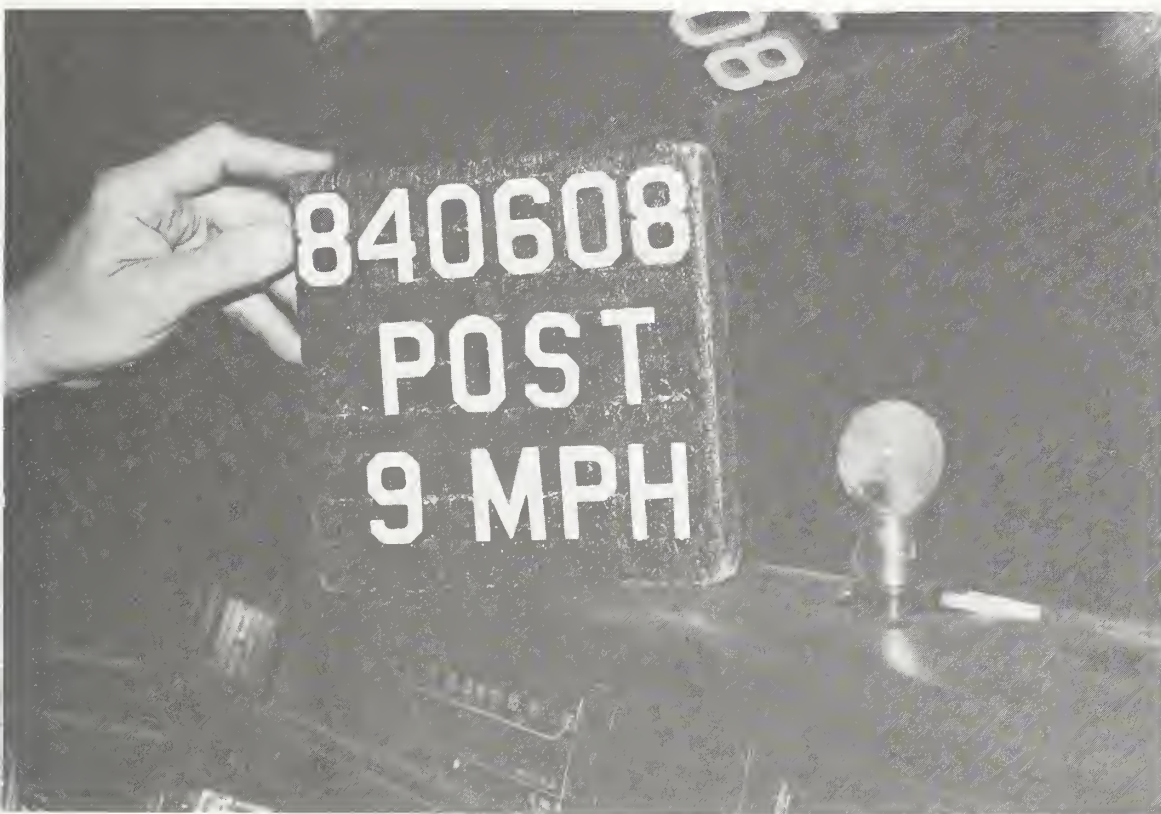


Figure A-19. TEST 840608B POST-TEST - FIRED FLASHBULB



Figure A-20. TEST 840611 PRE-TEST - VIEW 1

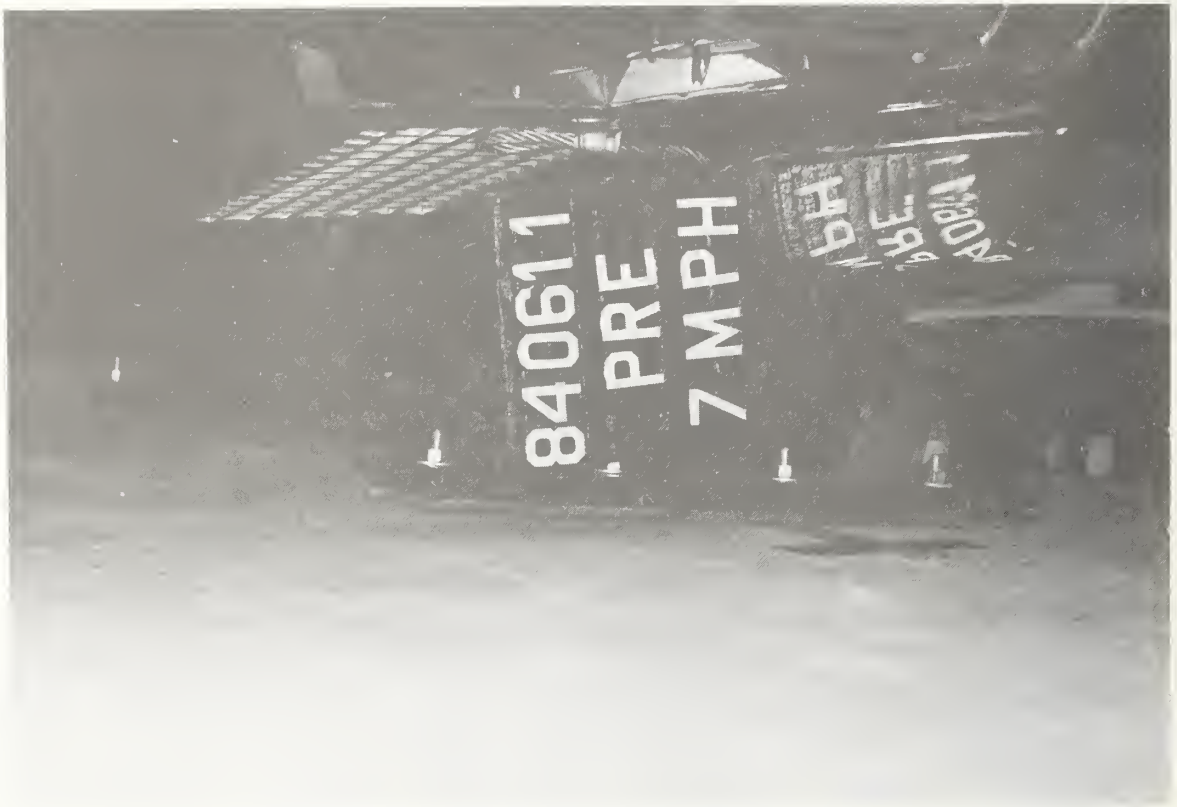


Figure A-21. TEST 840611 PRE-TEST - VIEW 2

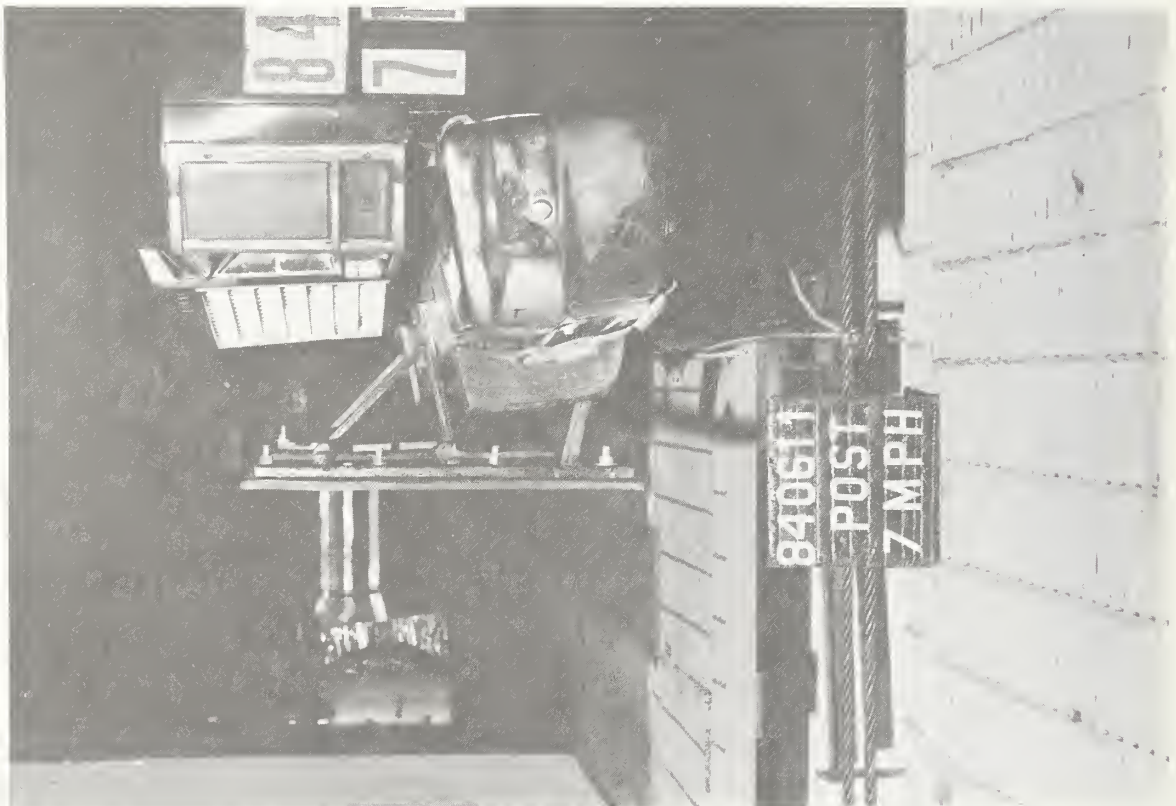


Figure A-22. TEST 840611 POST-TEST - VIEW 1

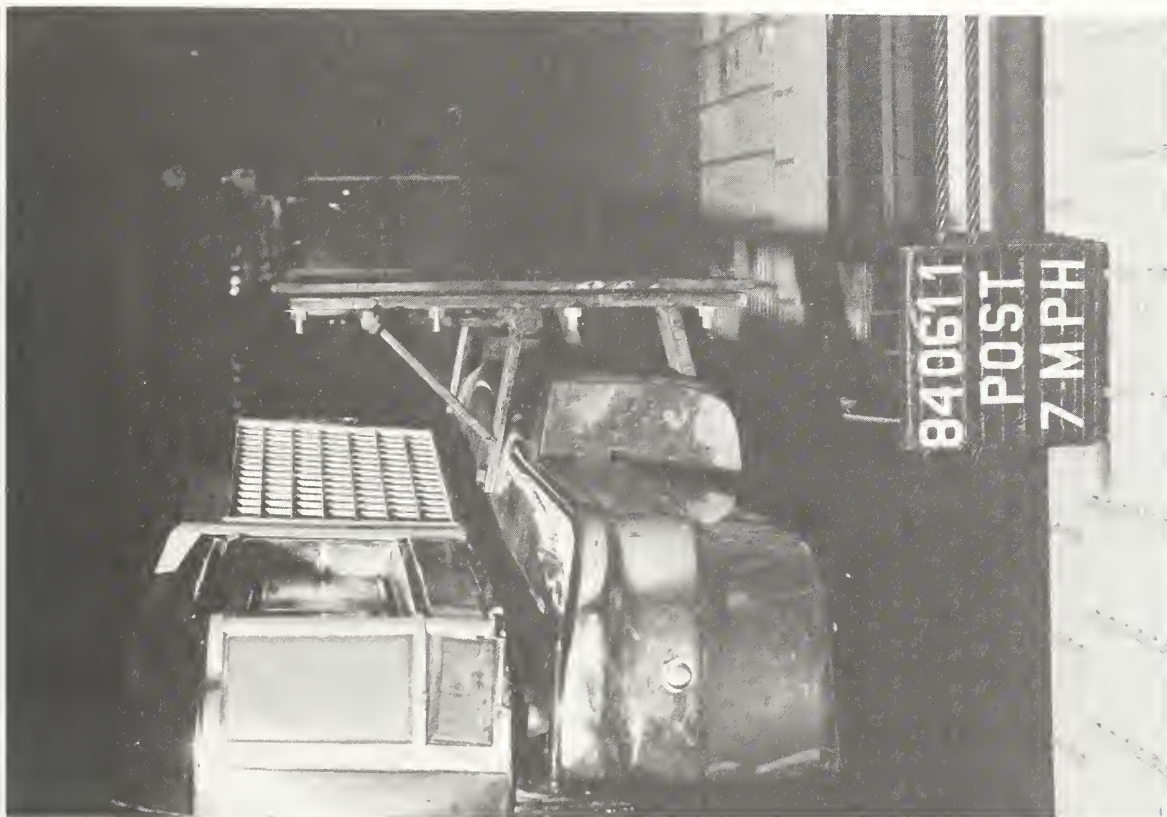


Figure A-23. TEST 840611 POST-TEST - VIEW 2



Figure A-24. TEST 840611 POST-TEST - FIRED FLASHBULB

APPENDIX B
DATA PLOT PRESENTATION

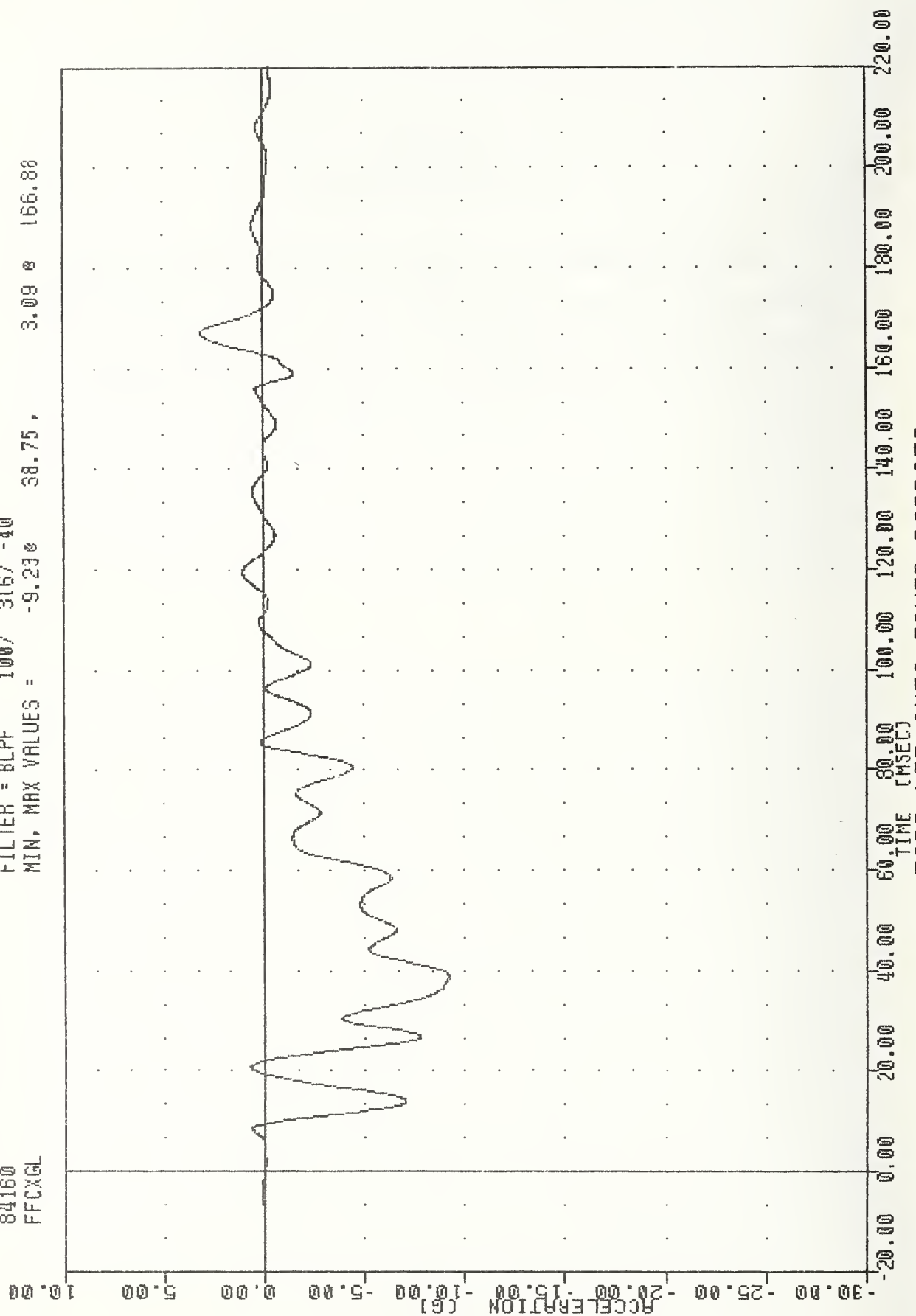
Data plots generated from the crash test data are presented on the following pages. All data are recorded on magnetic tape for inclusion in the NHTSA crash test data base system. All data were filtered according to SAE J211, except that dummy thorax data were filtered using the HSRI filter.

5.1 MPH 840608
AIR BAG DEMONSTRATION
84160
FFCXGL

PLOT DATE 13-JUN-84 13:52:35

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = -9.230 38.75, 3.09 166.88



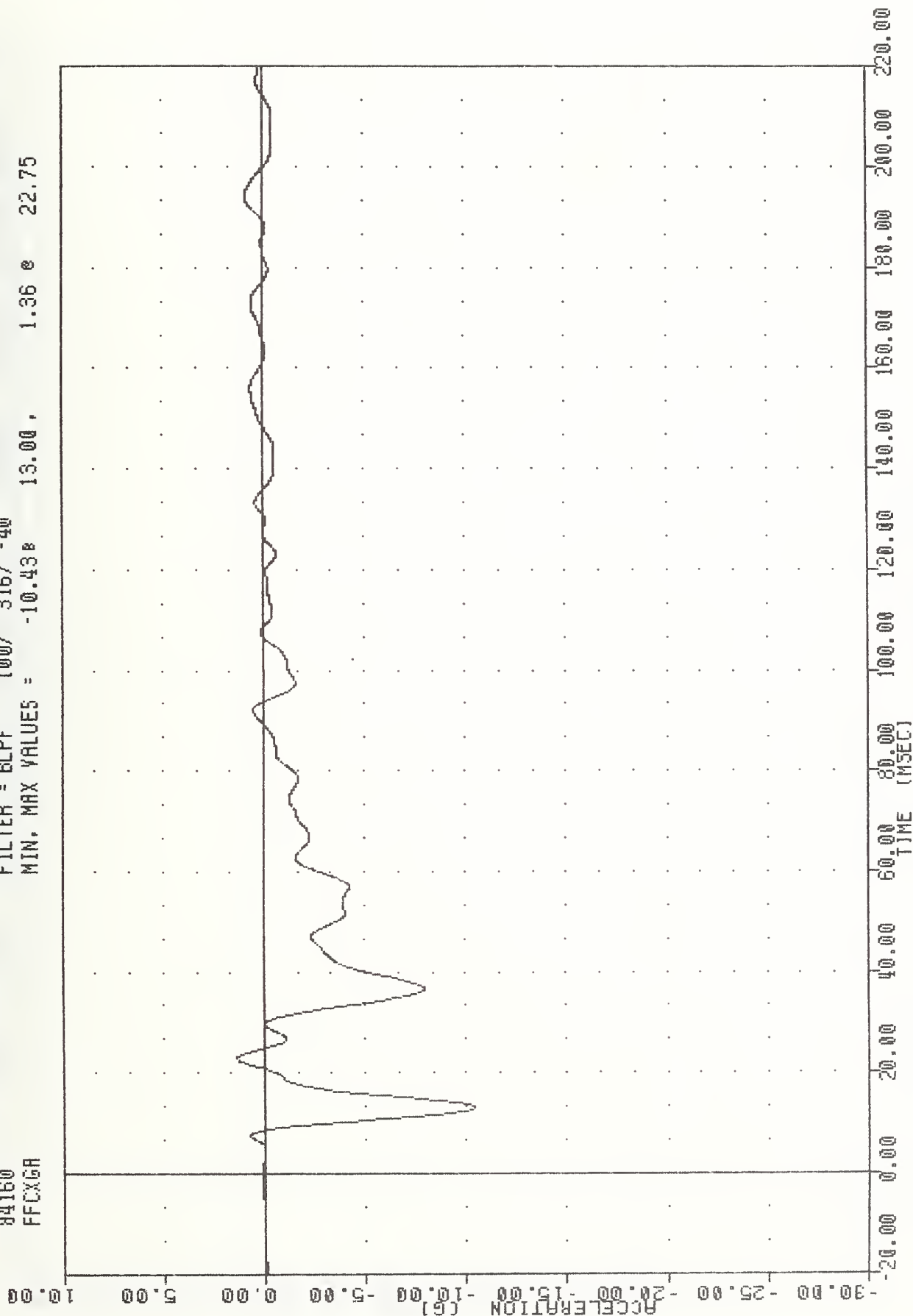
FORD LTD INTO FIXED BARRIER
LEFT FRONT FRAME X-MEMBER ACCEL X AXIS

5.1 MPH 840608
AIR BAG DEMONSTRATION
84160
FFCXGR

PLOT DATE 13-JUN-84 13:52:35

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = -10.438 13.00 , 1.36 22.75



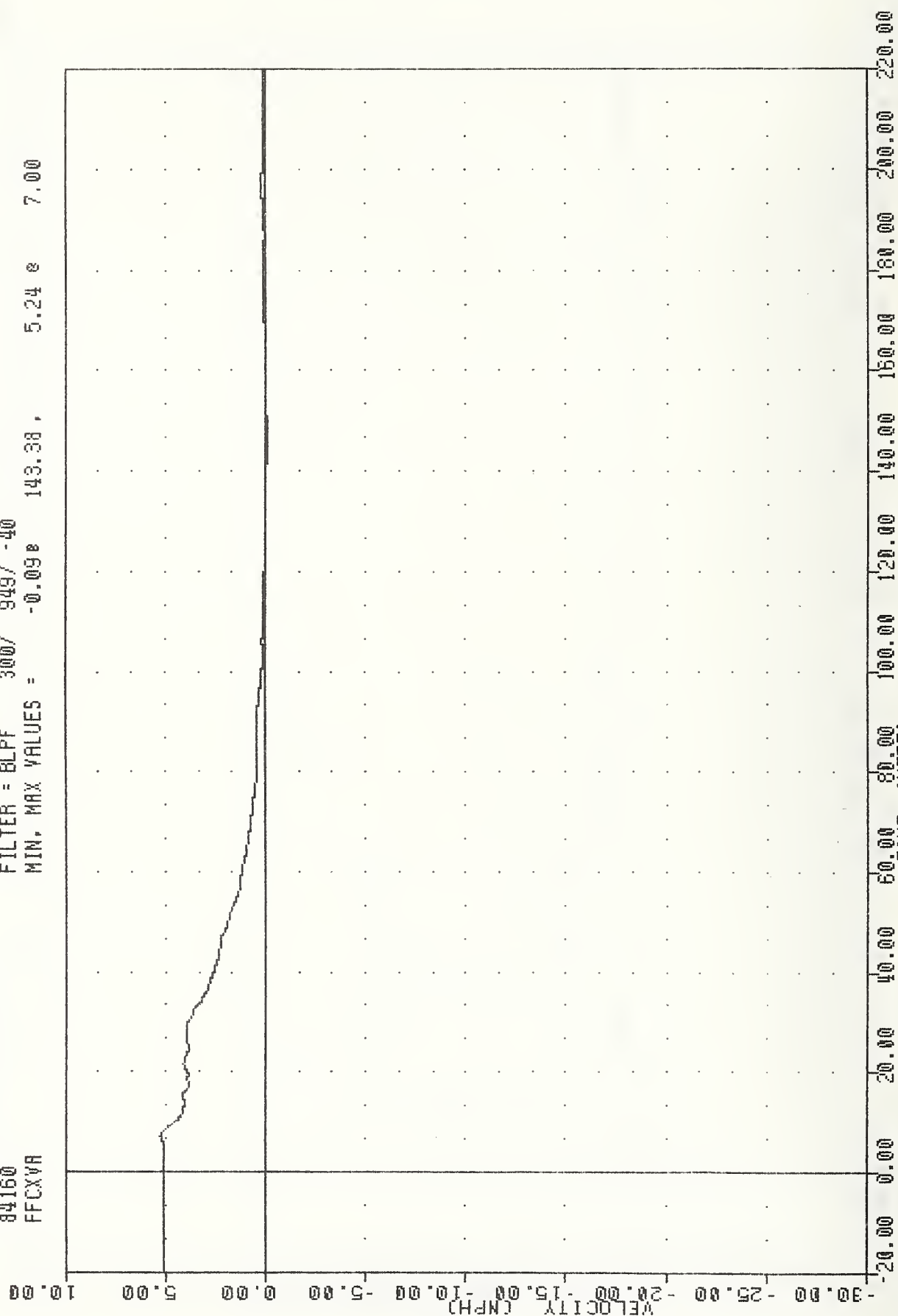
FORD LTD INTO FIXED BARRIER
RIGHT FRONT FRAME X-MEMBER ACCEL X AXIS

5.1 MPH , 840608
AIR BAG DEMONSTRATION
84160
FFCXVR

PLOT DATE 26-JUN-84 13:37:00

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = -0.098 143.38 , 5.24 e 7.00



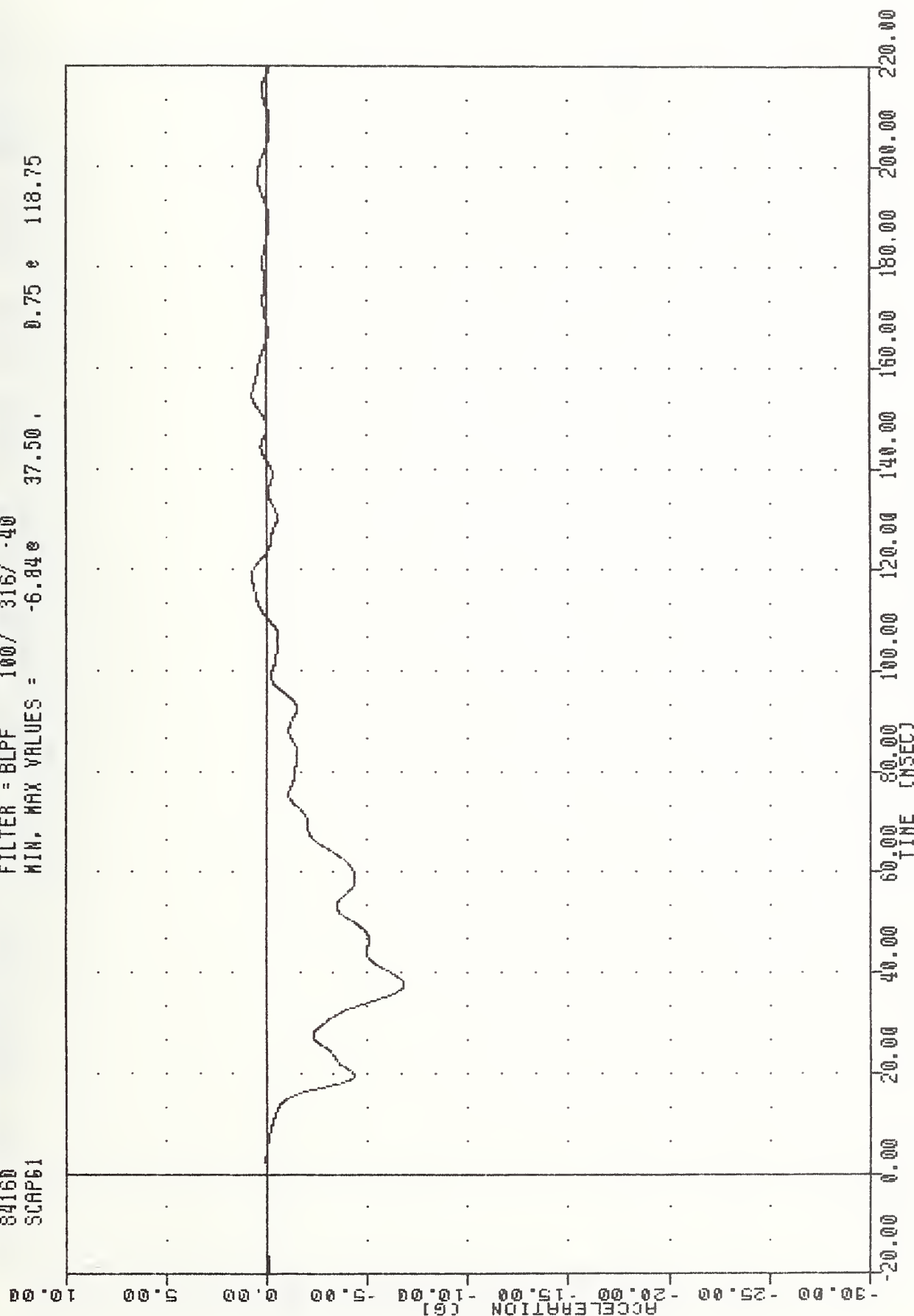
FORD LTD INTO FIXED BARRIER
DELTA V USING FFCXGR

5.1 MPH
AIR BAG DEMONSTRATION
84160
SCAP61

PLU1 DATE 13-JUN-84 13:52:35

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = -6.84e 37.50 , 0.75 e 118.75



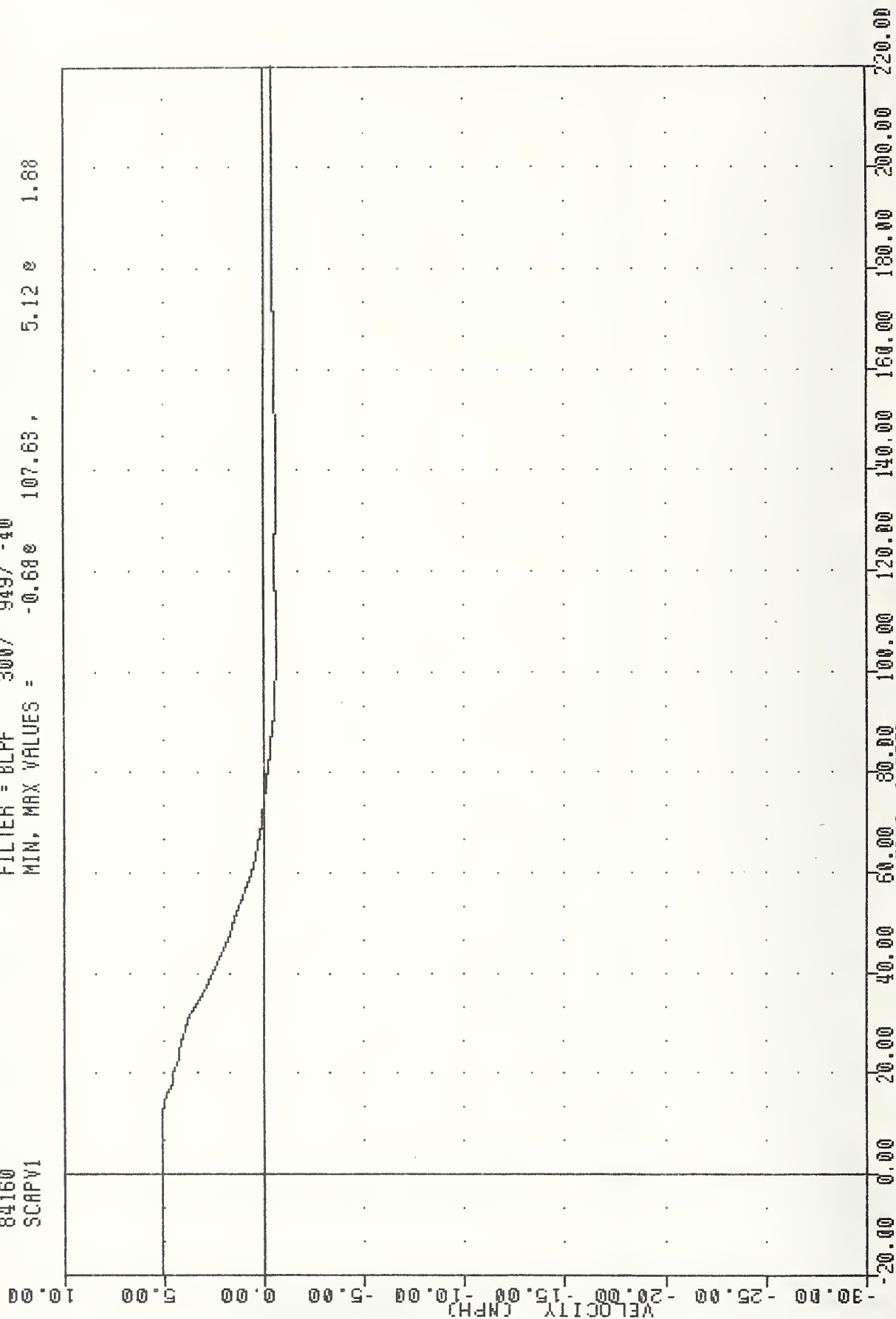
FORD LTD INTO FIXED BARRIER
STEERING COLUMN ACCELERATION LOWER

5.1 MPH , 840608
 AIR BAG DEMONSTRATION
 84160
 SCAPV1

PLOT DATE 26-JUN-84 13:37:00

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = -0.68e 107.63 , 5.12 e 1.88



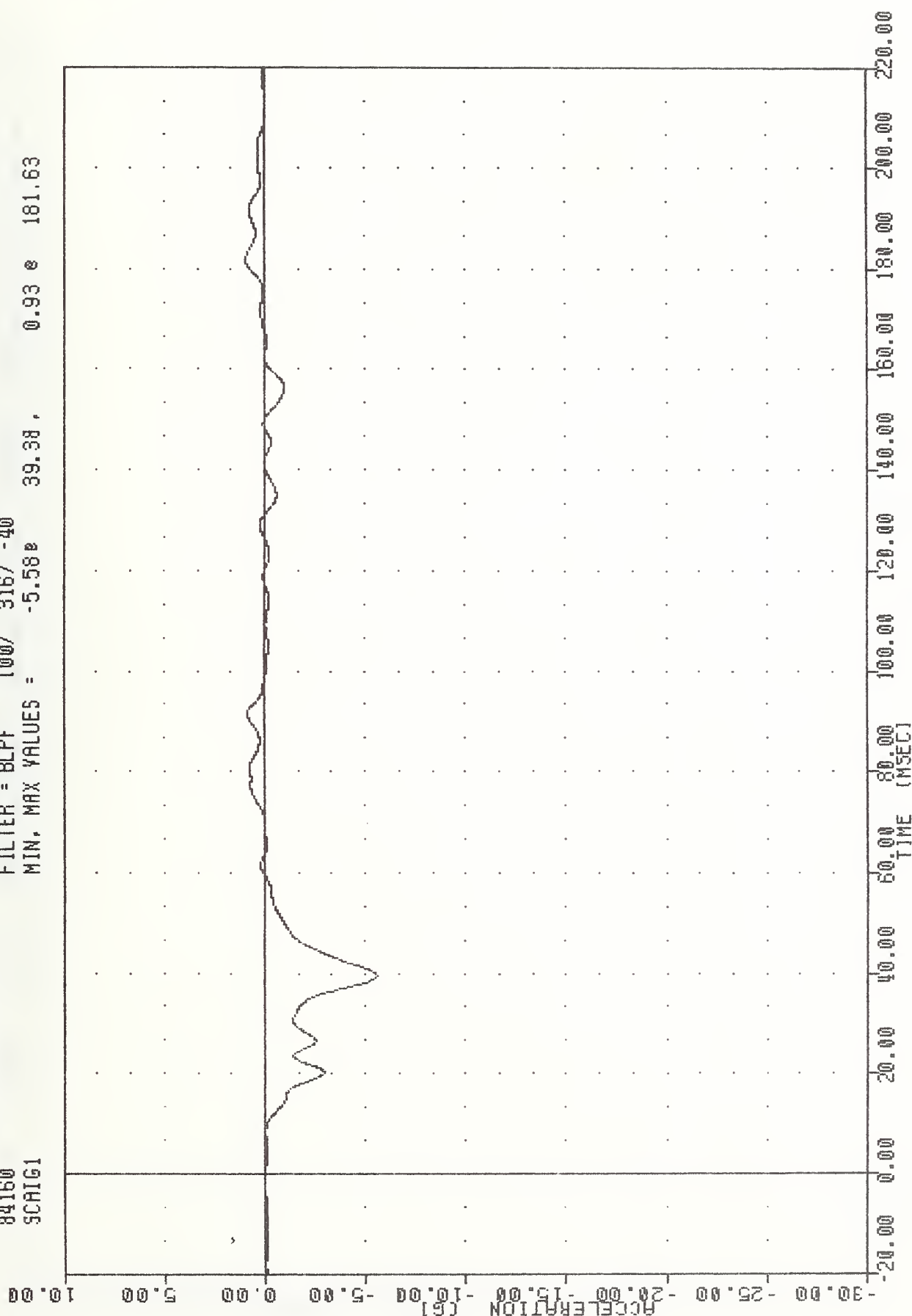
FORD LTD INTO FIXED BARRIER
 DELTA V USING SCAPG1

5.1 MPH , 840608
AIR BAG DEMONSTRATION
84160
SCAIG1

PLUT DATE 13-JUN-84 13:52:30

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = -5.58e 39.38, 0.93 e 181.63



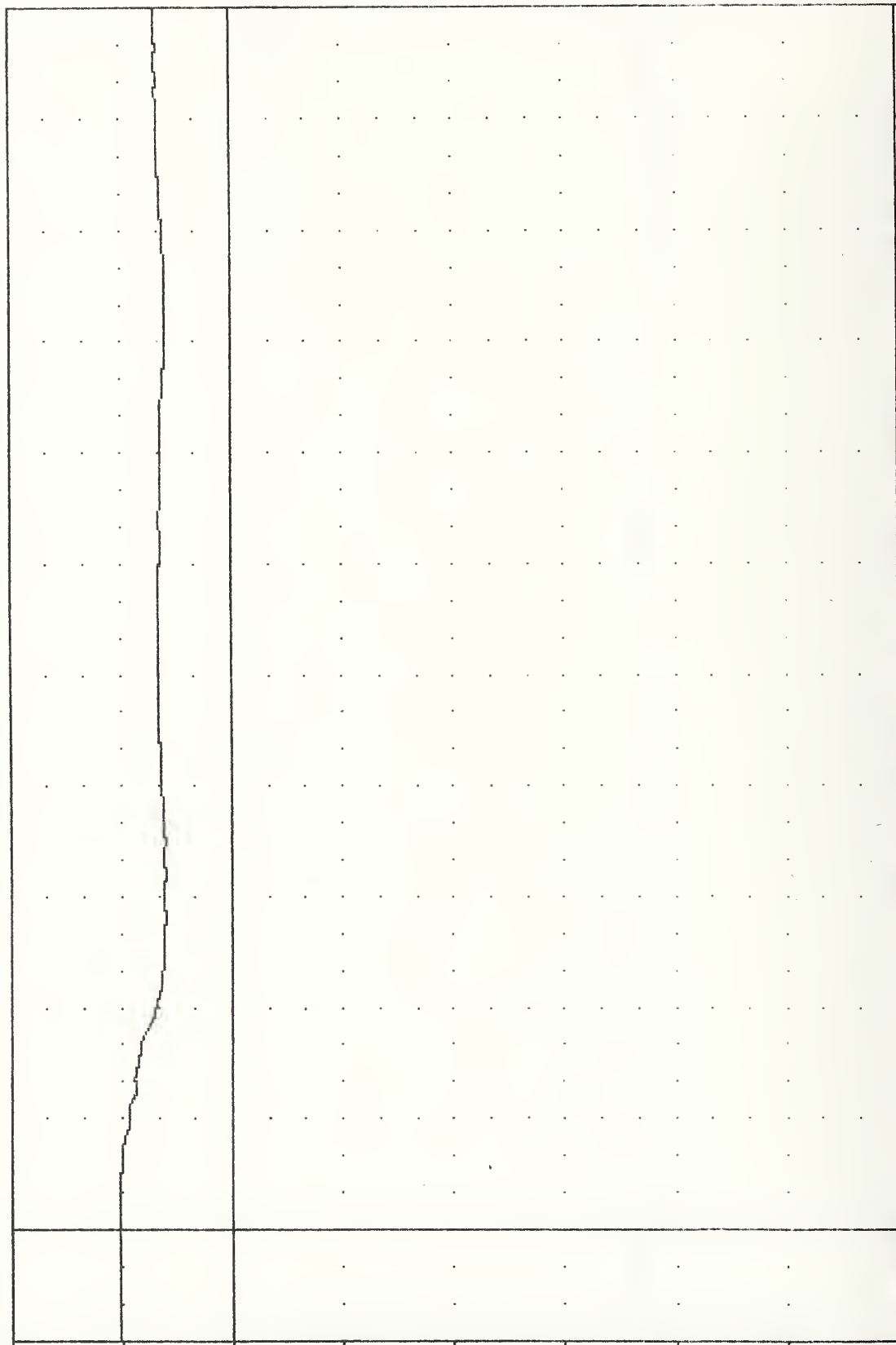
FORD LTD INTO FIXED BARRIER
STEERING COLUMN ACCELERATION LOWER

5.1 MPH
AIR BAG DEMONSTRATION
84160
SCAIV1

PLU: DALL 10 JUL 70 00:47:41

FILTER = BLPF 300/ 949/ -40
MIN. MAX VALUES = 2.98 163.38, 5.10 -20.00

VELCITY (MPH)



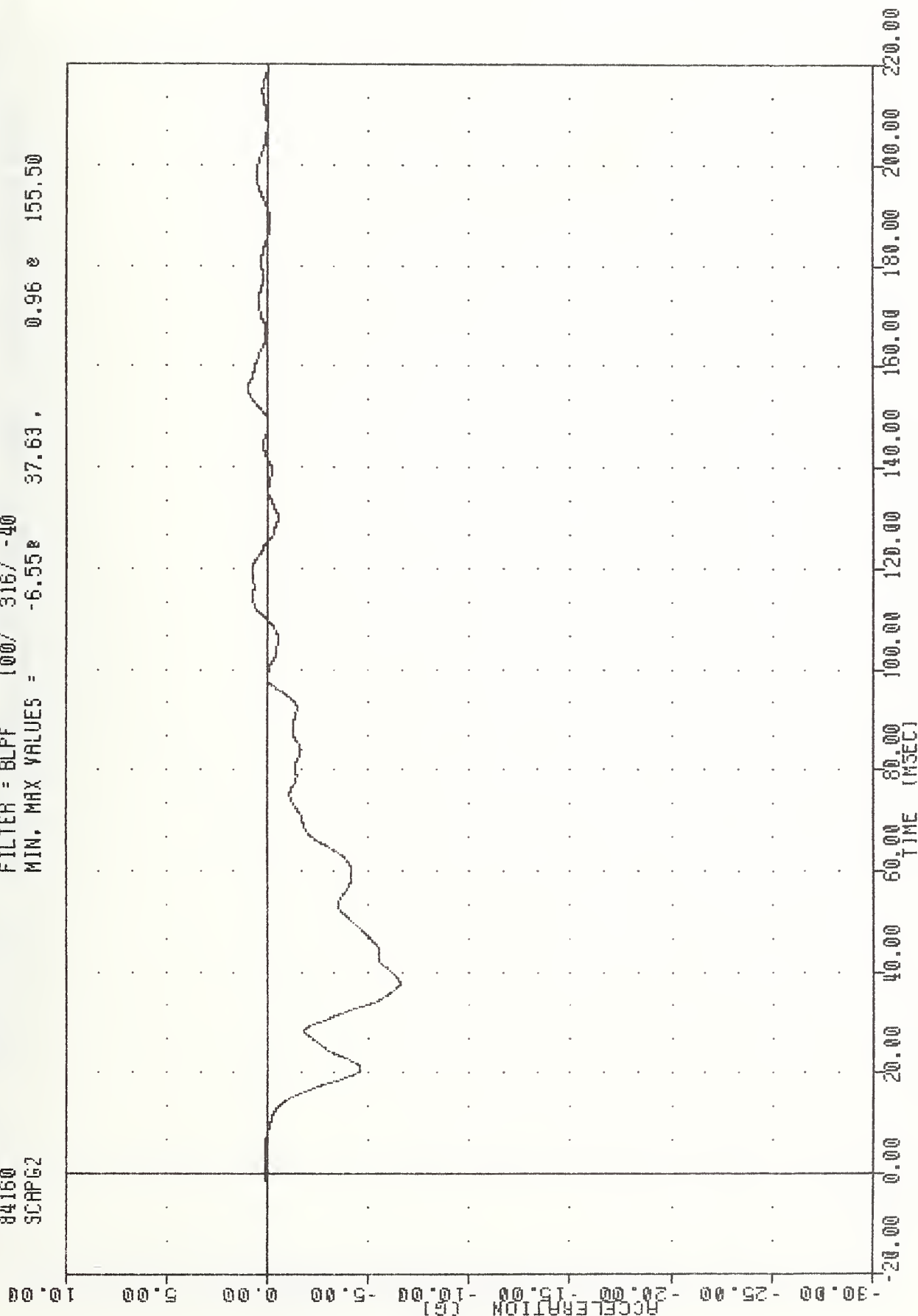
TIME (MSEC)

FORD LTD INTO BARRIER
DELTA V USING SCAIG1

5.1 MPH
AIR BAG DEMONSTRATION
84160
SCAPG2

PLOT DATE 13-JUN-84 13:52:35

FILTER = BLPF 100/ 316/ -40
MIN. MAX VALUES = -6.55 37.63, 0.96 155.50



FORD LTD INTO FIXED BARRIER
STEERING COLUMN ACCELERATION UPPER

5.1 MPH 840608
AIR BAG DEMONSTRATION
84160
SCRPV2

PLOT DATE 18-JUL-84 10:27:52

FILTER = BLPF 300/ 949/ -40

MIN, MAX VALUES = -0.550 105.50, 5.13 0 4.88

10.00

5.00

0.00

-5.00

-10.00

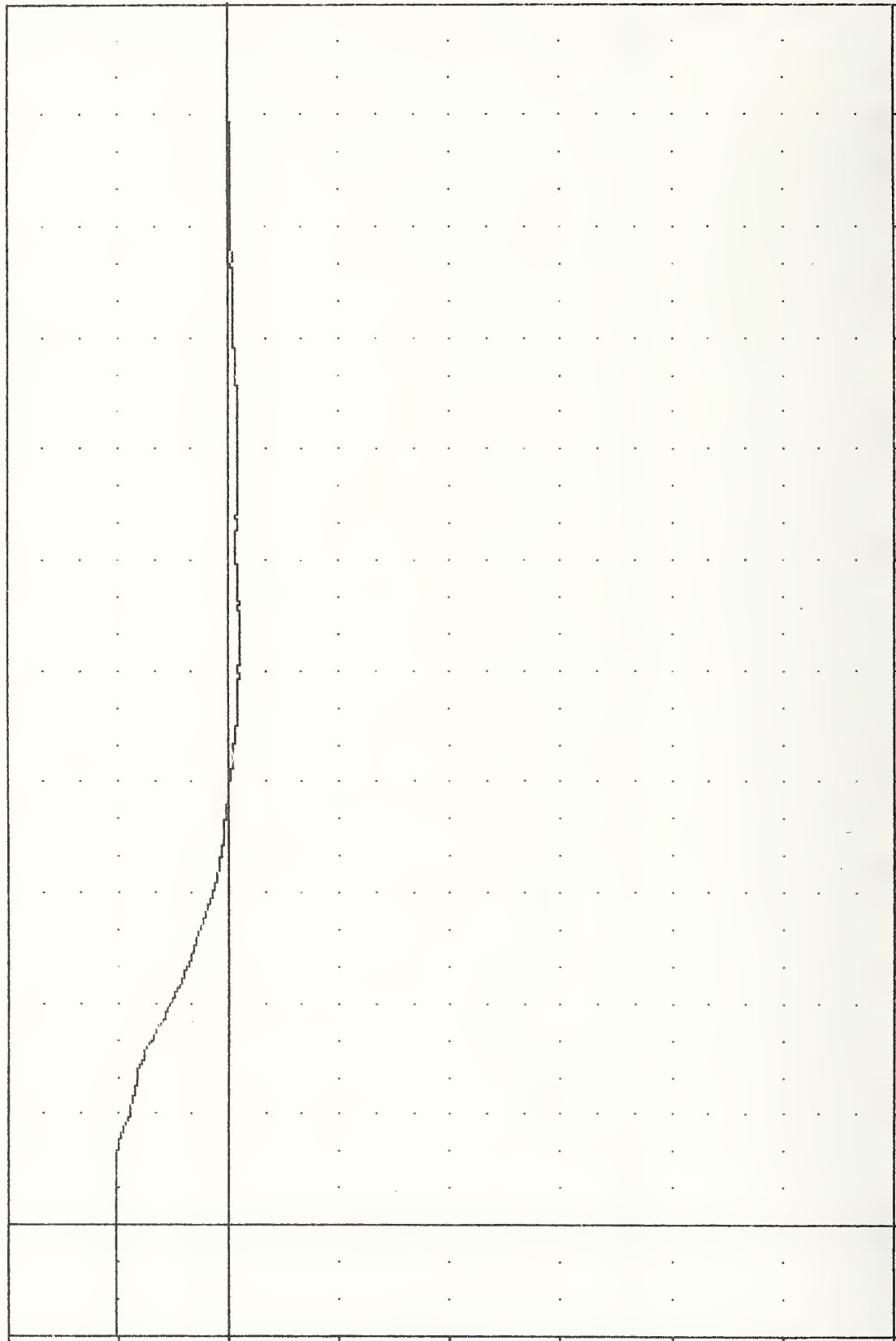
-15.00

-20.00

-25.00

-30.00

VELOCITY (MPH)



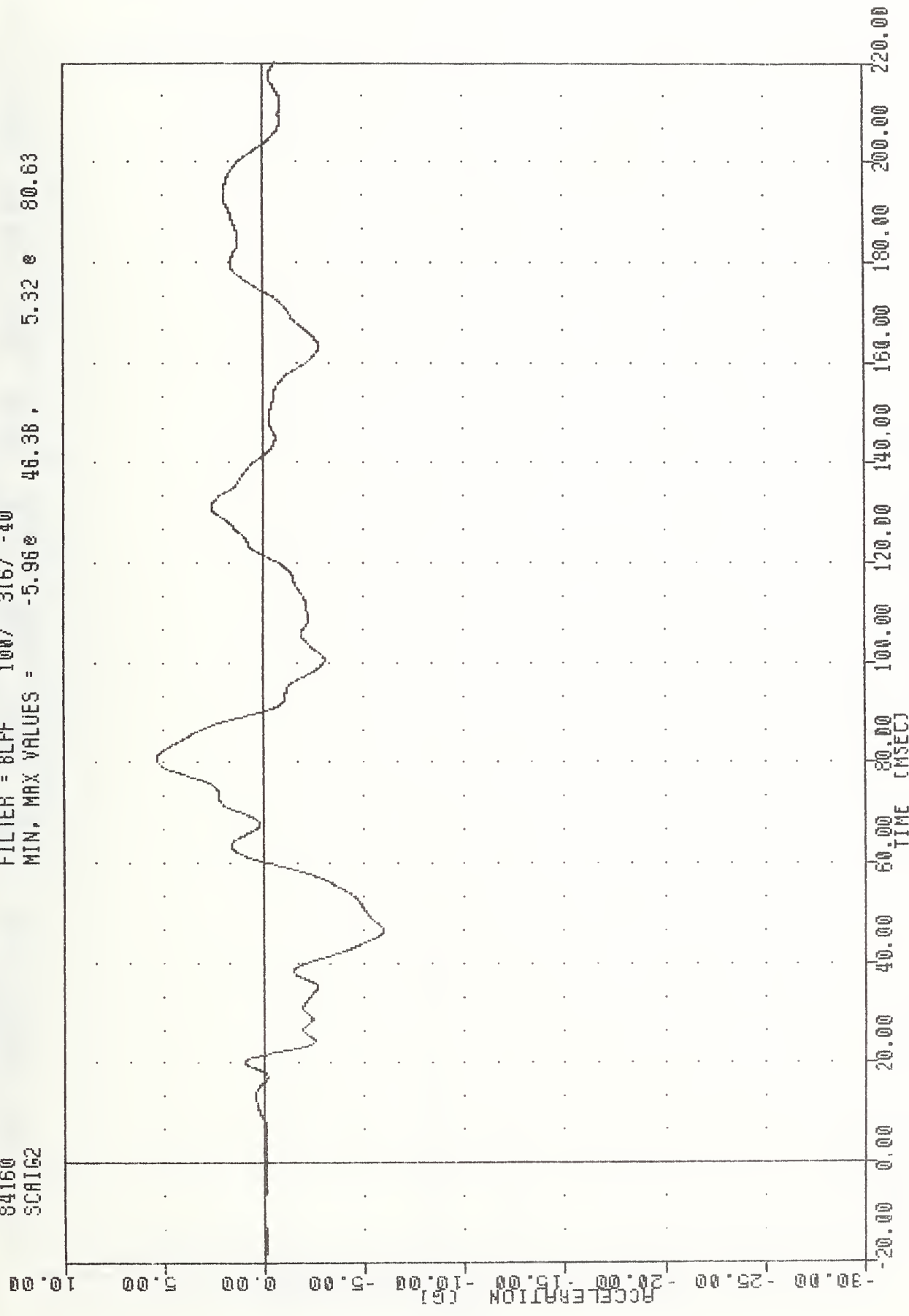
-20.00 0.00 20.00 40.00 60.00 80.00 100.00 120.00 140.00 160.00 180.00 200.00 220.00

TIME (msec)

FORD LTD INTO FIXED BARRIER
DELTA V USING SCAPG2

5.1 MPH 840608
AIR BAG DEMONSTRATION
84160
SCA162

PLOT DATE 13-JUN-84 13:52:35
FILTER = 8LFF 100/ 316/ -40
MIN. MAX VALUES = -5.96e 46.38e 5.32e 80.63



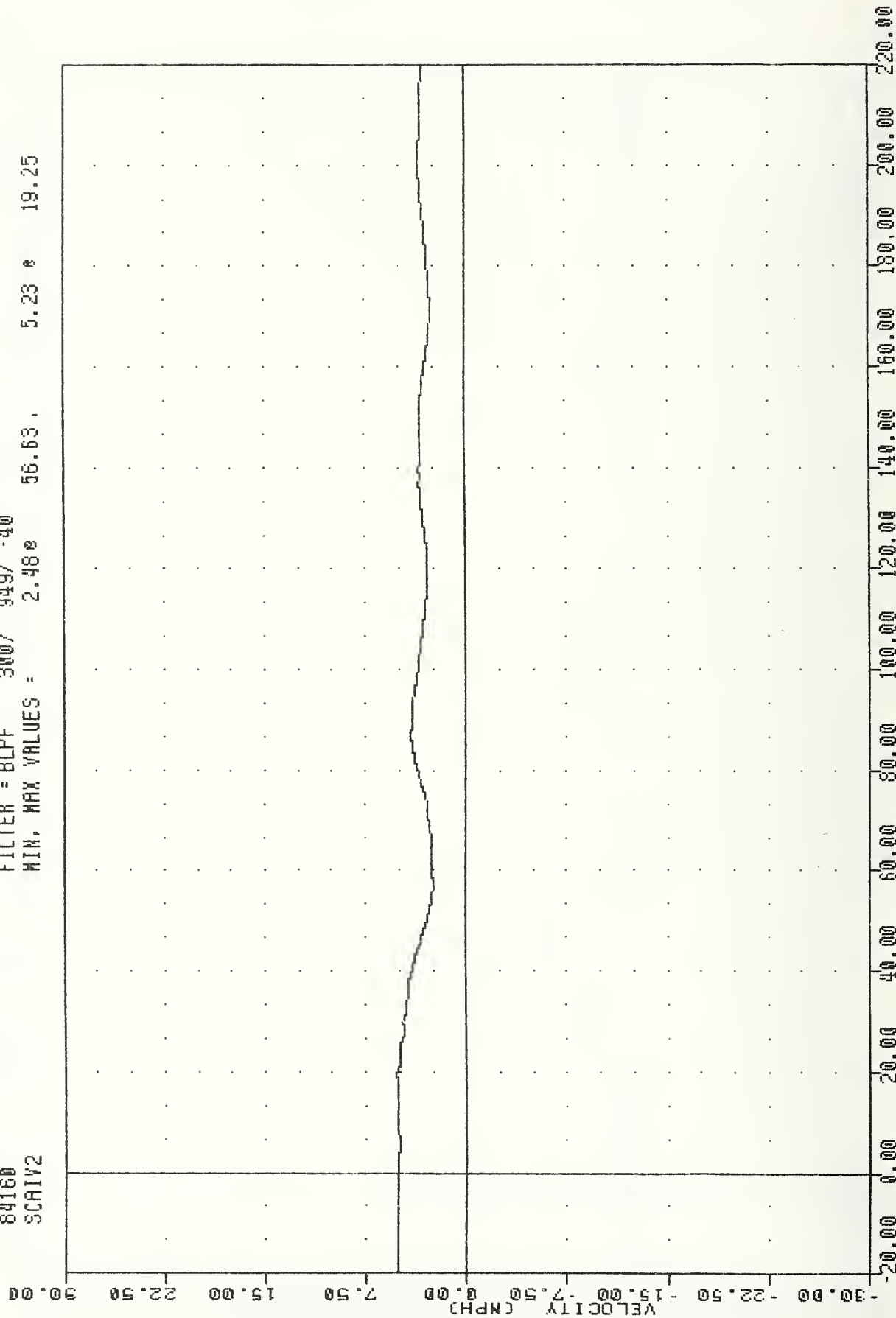
FORD LTD INTO FIXED BARRIER
STEERING COLUMN ACCELERATION UPPER

5.1 MPH , 840608
AIR BAG DEMONSTRATION
84160
SCAIV2

PLOT DATE 18-JUL-84 10:27:52

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = 2.48e 56.63 , 5.23 e 19.25



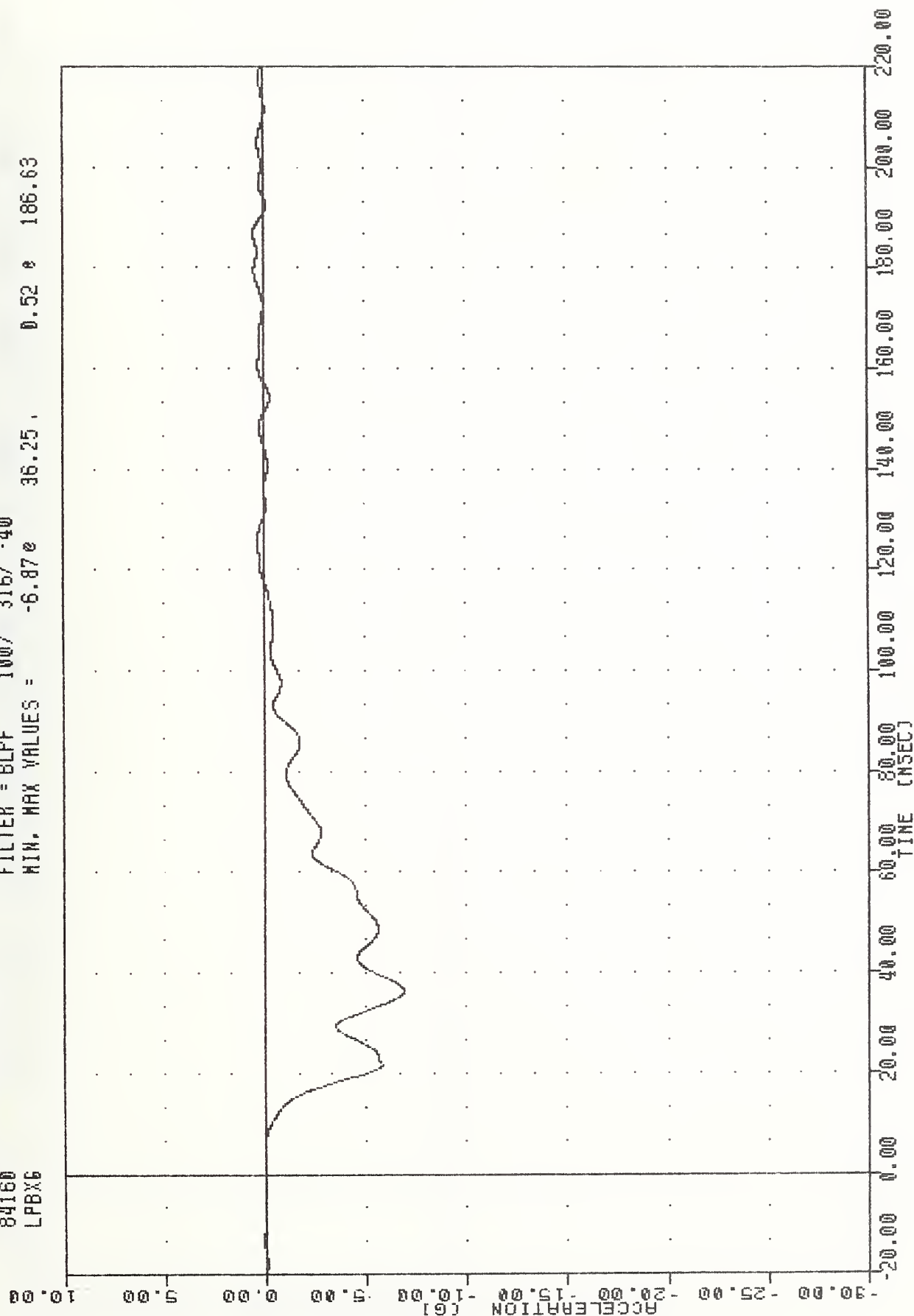
FORD LTD INTO FIXED BARRIER
DELTA V USING SCAIG2

5.1 MPH . 840603
AIR BAG DEMONSTRATION
84160
LPBX6

PLOT DATE 13-JUN-84 13:52:35

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = -6.87e 36.25 , 0.52 e 186.63



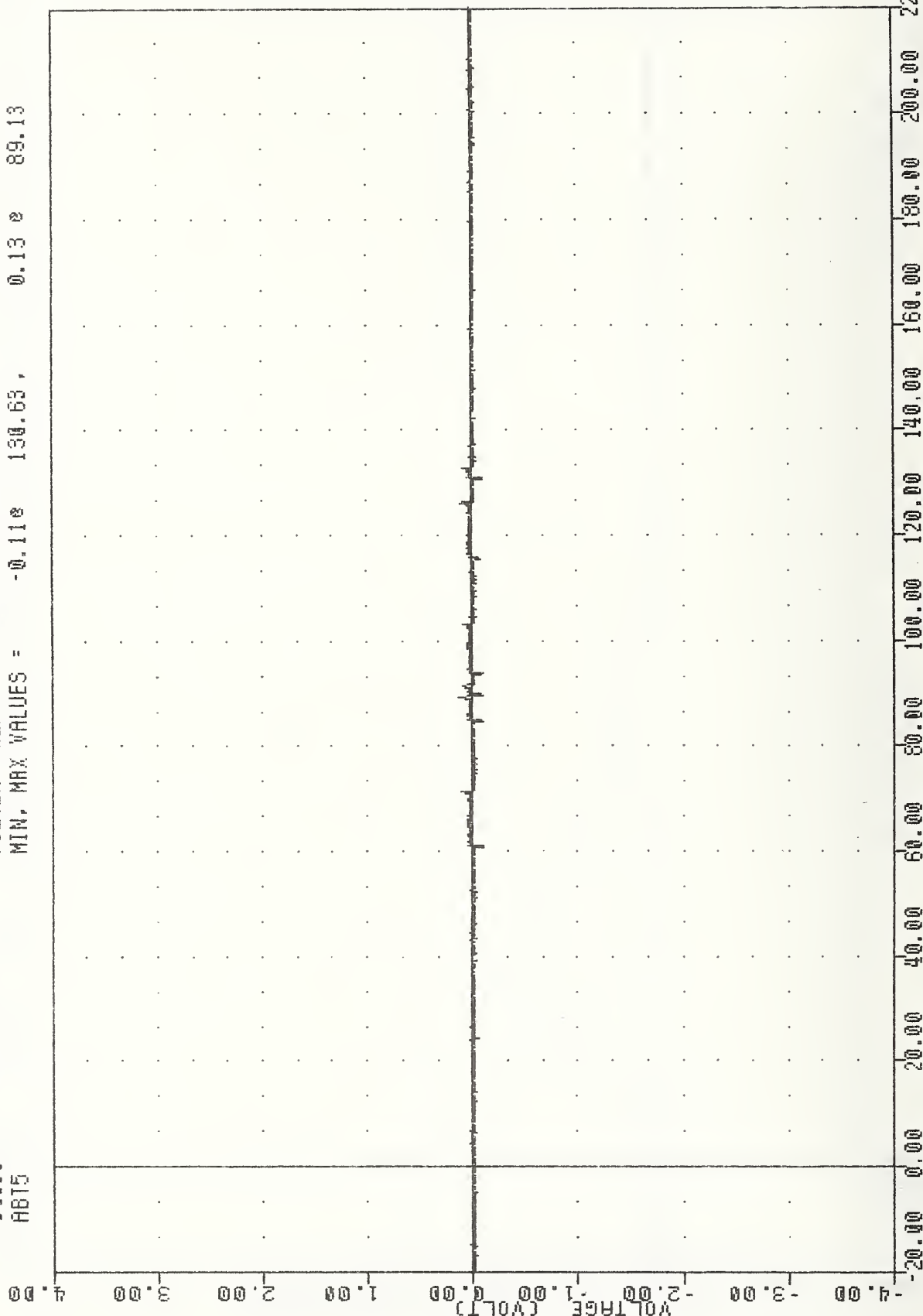
FORD LTD INTO FIXED BARRIER
PILLAR LEFT B ACCELERATION X AXIS

5.1 MPH , 840608
AIR BAG DEMONSTRATION
84160
ABT5

PLOT DATE 13-JUN-84 13:52:35

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -0.11e 130.63, 0.13 e 89.13



FORD LTD INTO FIXED BARRIER
BREED SWITCH

5.1 MPH 840608 13-JUN-84 13:52:35

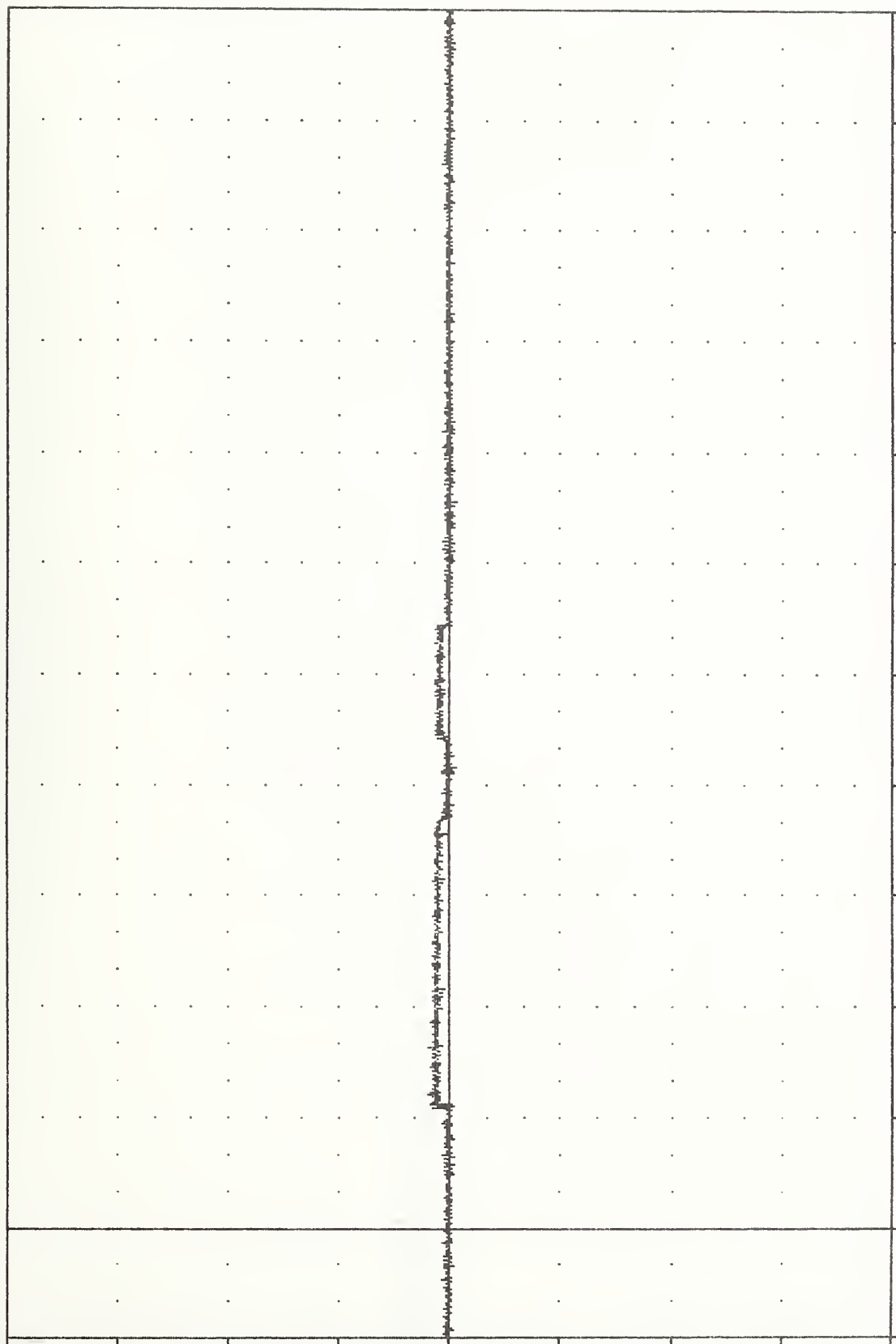
AIR BAG DEMONSTRATION
84160
ABT4

FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = -0.248 130.88, 0.77 e 24.13

VOLTAGE (VOLT)

B-15



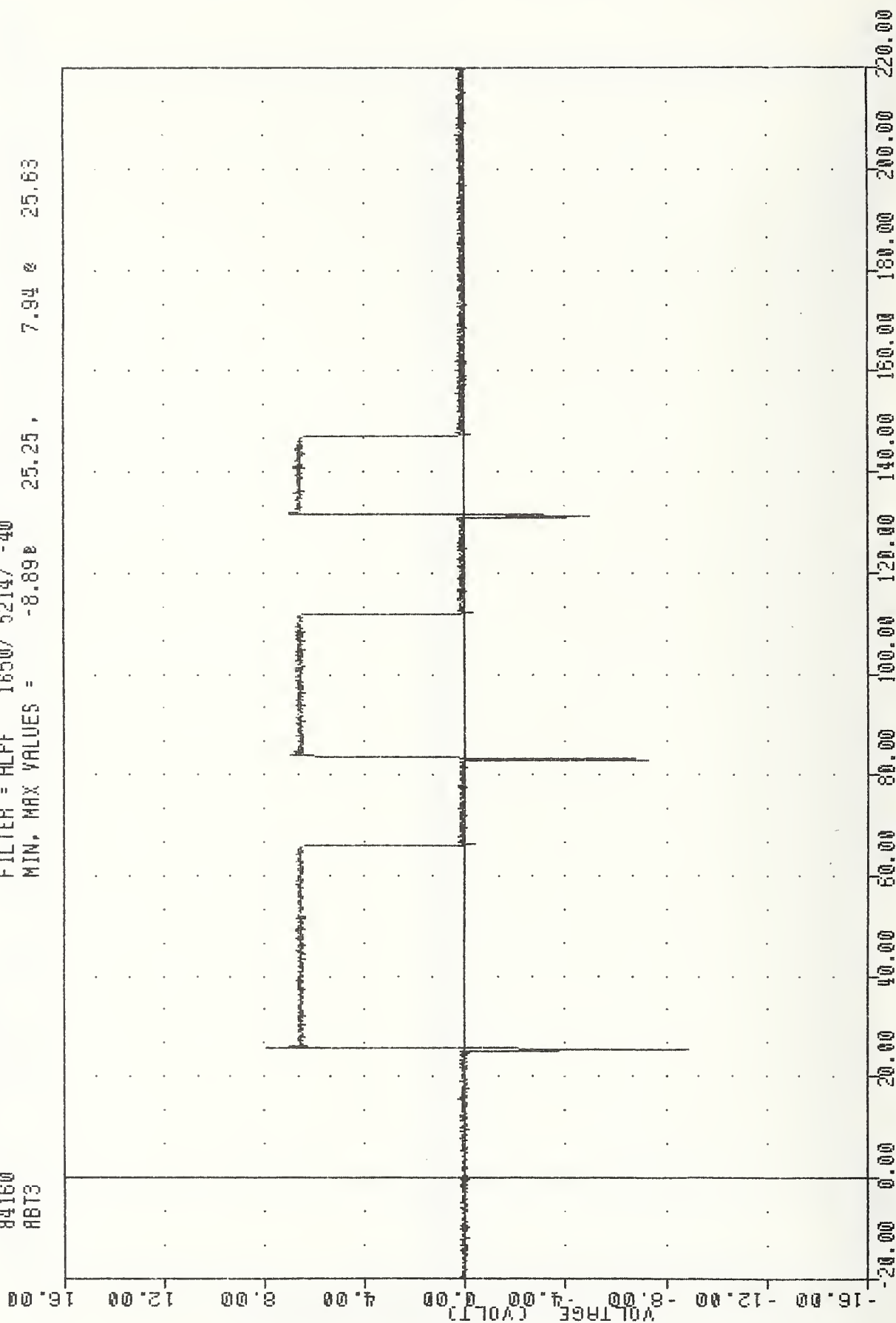
TIME (MSEC)
FORD LTD INTO FIXED BARRIER
HIGH LEVEL SW

5.1 MPH , 840608
AIR BAG DEMONSTRATION
84160
ABT3

PLOT DATE 13-JUN-84 13:52:35

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -8.89e 25.25, 7.94 e 25.63



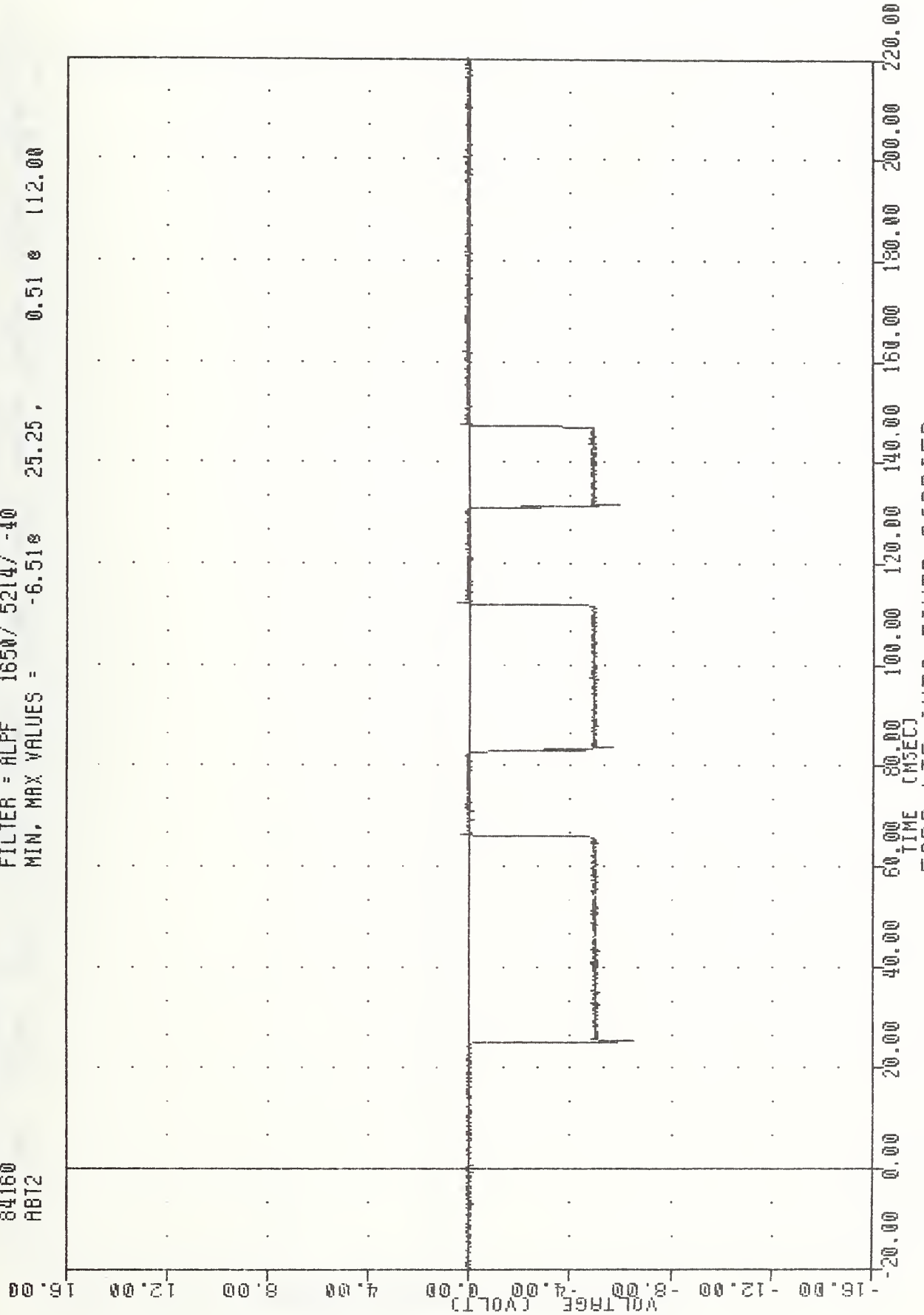
FORD LTD INTO FIXED BARRIER
AIR BAG SAFETY SENSOR

5.1 MPH , 840606
AIR BAG DEMONSTRATION
84160
ABT2

PLOT DATE 13-JUN-84 13:52:35

FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = -6.518 25.25, 0.518 112.00



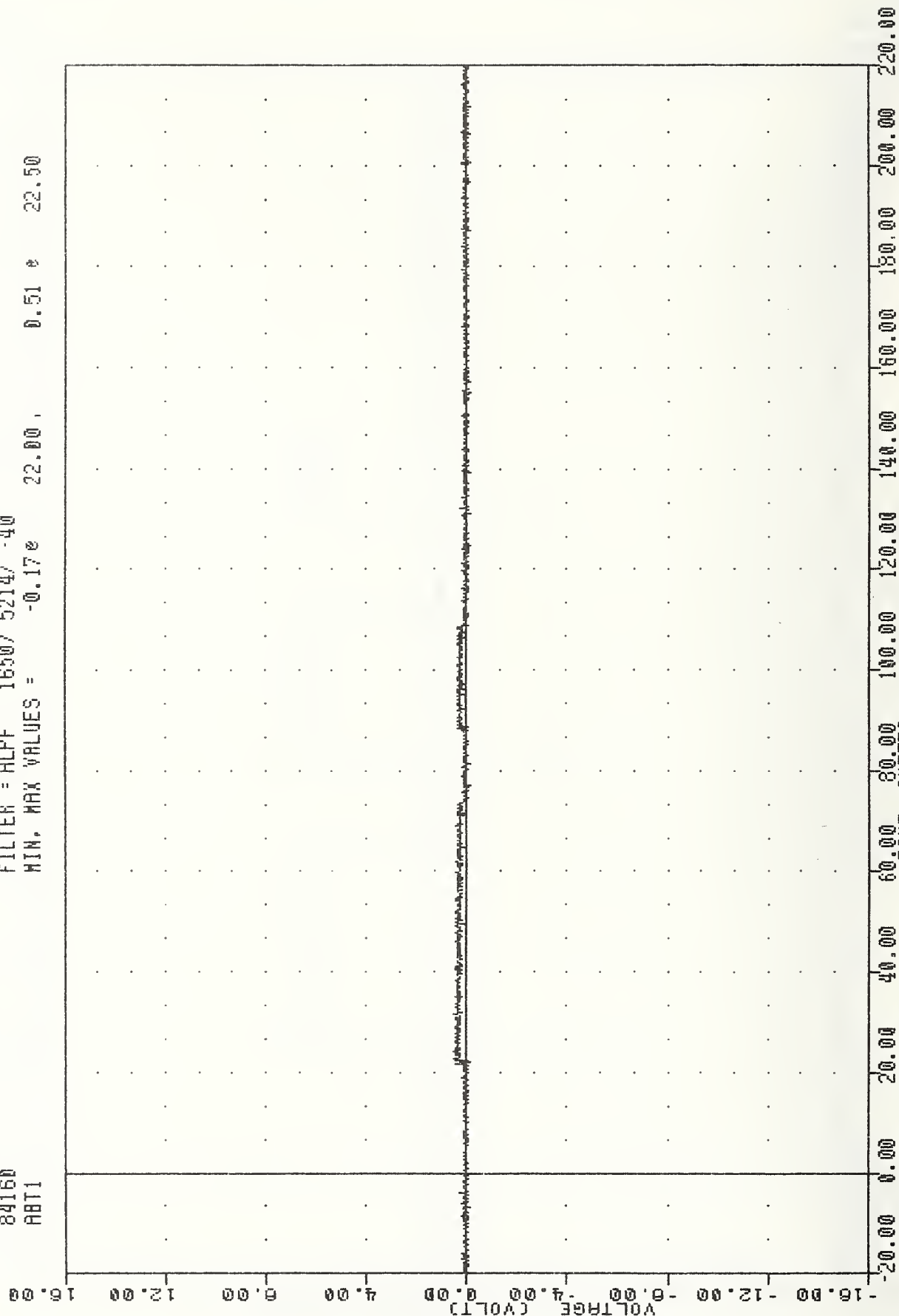
FORD LTD INTO FIXED BARRIER
AIR BAG RIGHT FRONT SENSOR

5.1 MPH
AIR BAG DEMONSTRATION
84160
ABT1

PLOT DATE 13-JUN-84 13:52:35

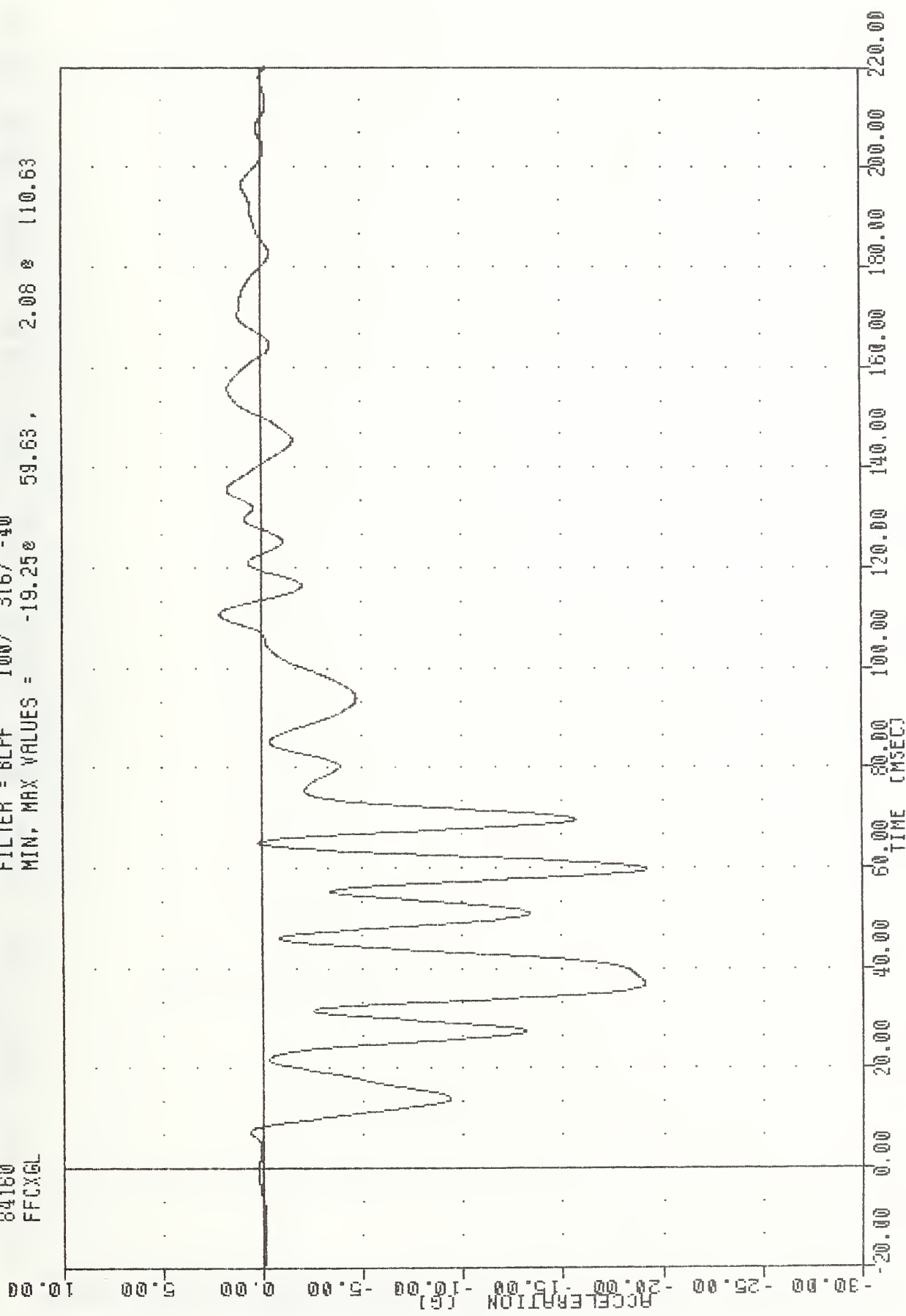
FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -0.17e 22.00 , 0.51 e 22.50



9.1 MPH , 840608
AIR BAG DEMONSTRATION
84160
FFCXGL

PLOT DATE 13-JUN-84 13:53:23
FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -19.250 59.63, 2.08 0 110.63



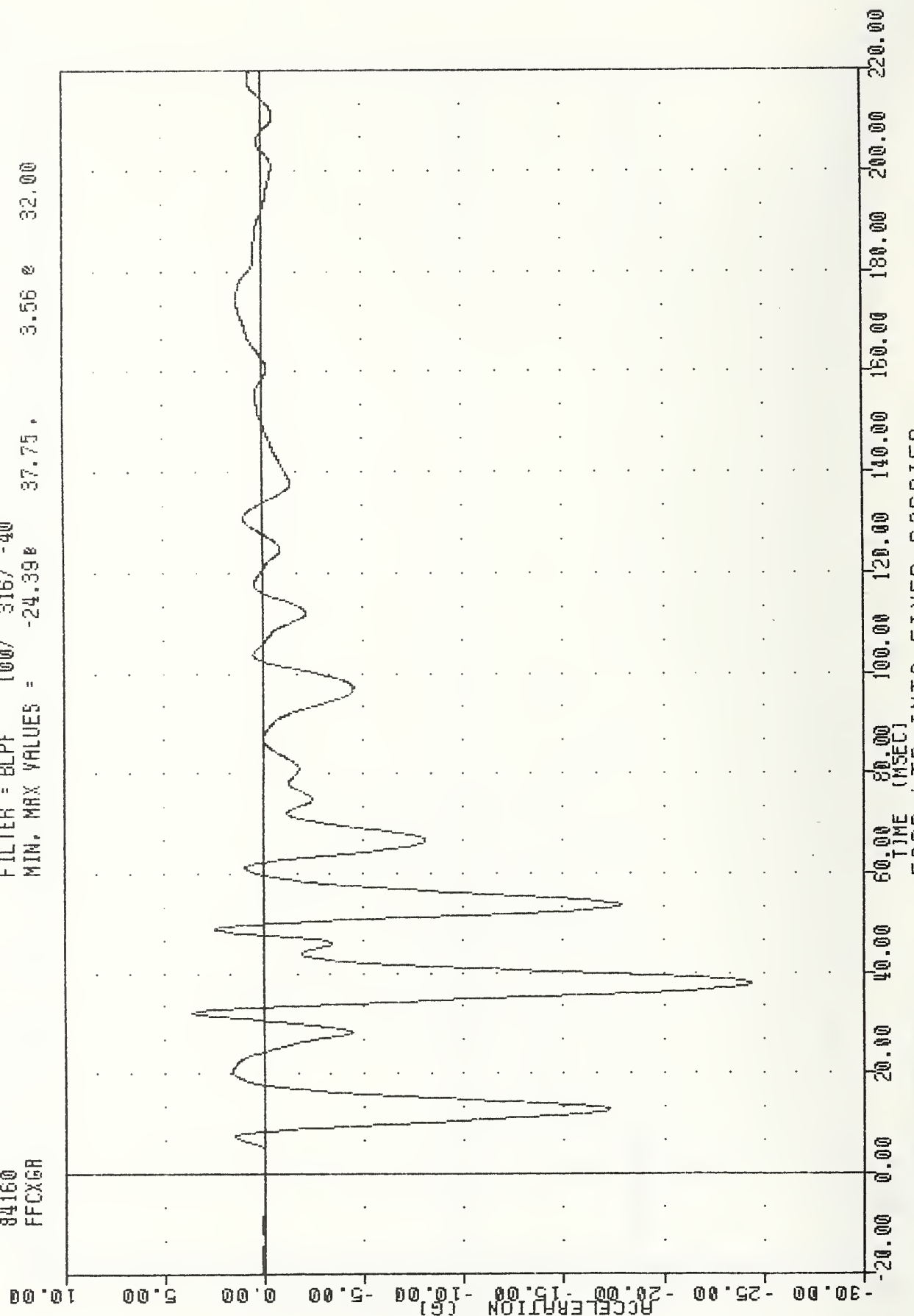
FORD LTD INTO FIXED BARRIER
LEFT FRONT FRAME X-MEMBER ACCEL X AXIS

9.1 MPH , 840508
AIR BAG DEMONSTRATION
84160
FFCXGR

PLOT DATE 13-JUN-84 13:53:23

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = -24.39g 37.75g 3.56g 32.00g



B-20

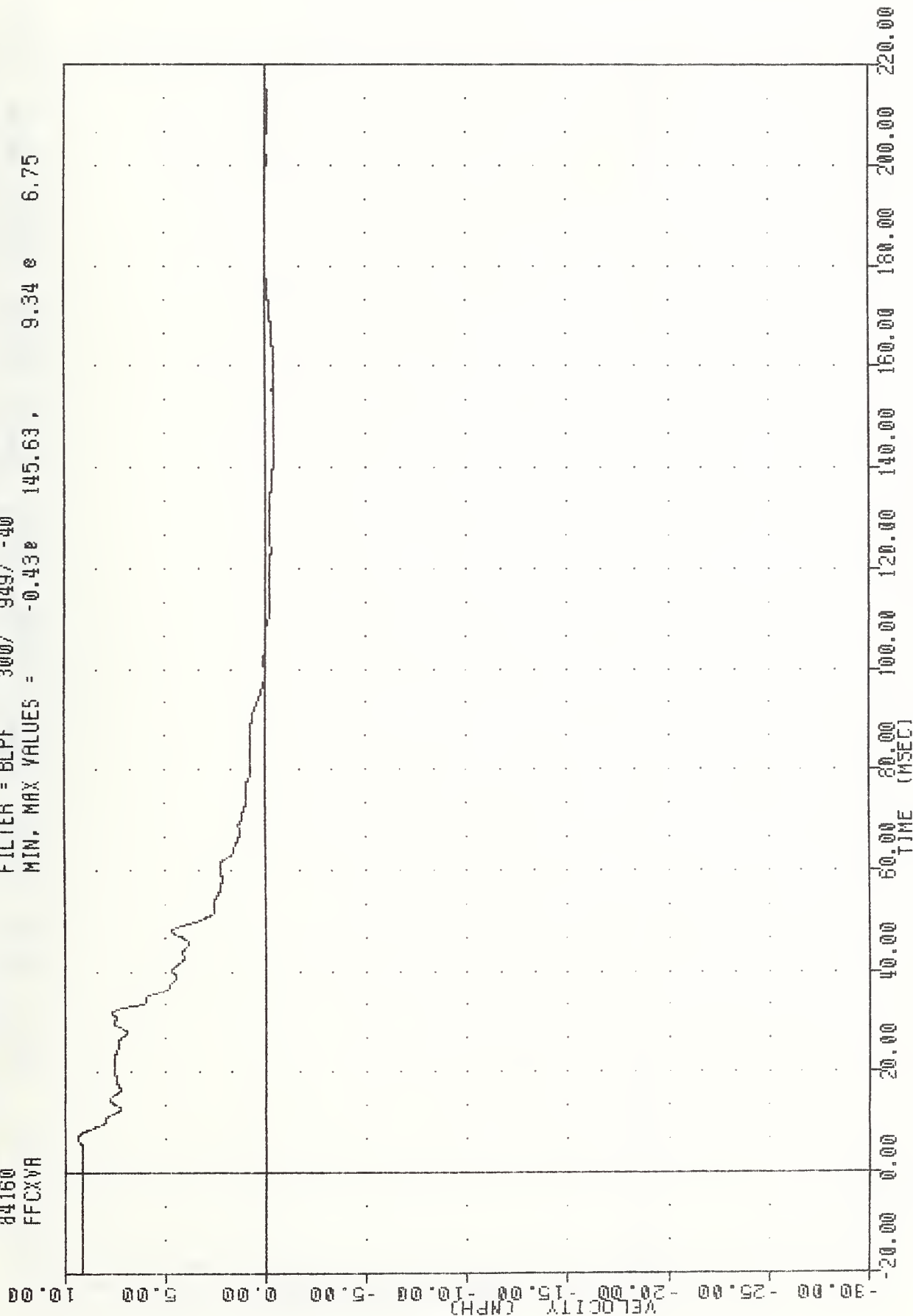
FORD LTD INTO FIXED BARRIER
RIGHT FRONT FRAME X-MEMBER ACCEL X AXIS

9.1 MPH , 840603
AIR BAG DEMONSTRATION
84160
FFCXVR

PLOT DATE 26-JUN-84 13:37:18

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = -0.43e 145.63, 9.34 e 6.75



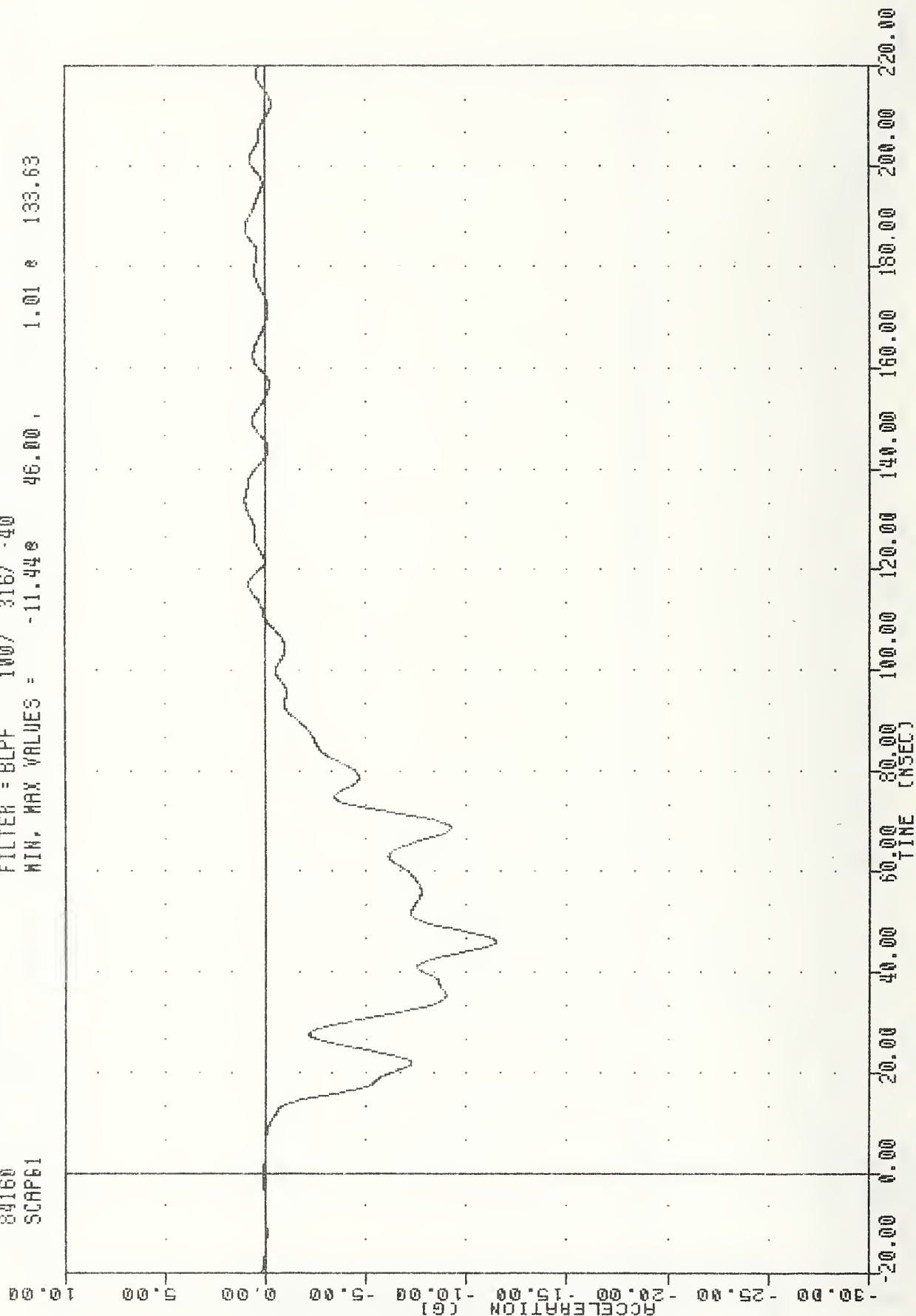
FORD LTD INTO FIXED BARRIER
DELTA V USING FFCXGR

9.1 MPH 840600
AIR BAG DEMONSTRATION
84160
SCAP61

PLUI DATE 13-JUN-84 13:53:23

FILTER = BLPF 100/ 316/ -40

MIN, MAX VALUES = -11.44e 46.00, 1.01 e 133.63



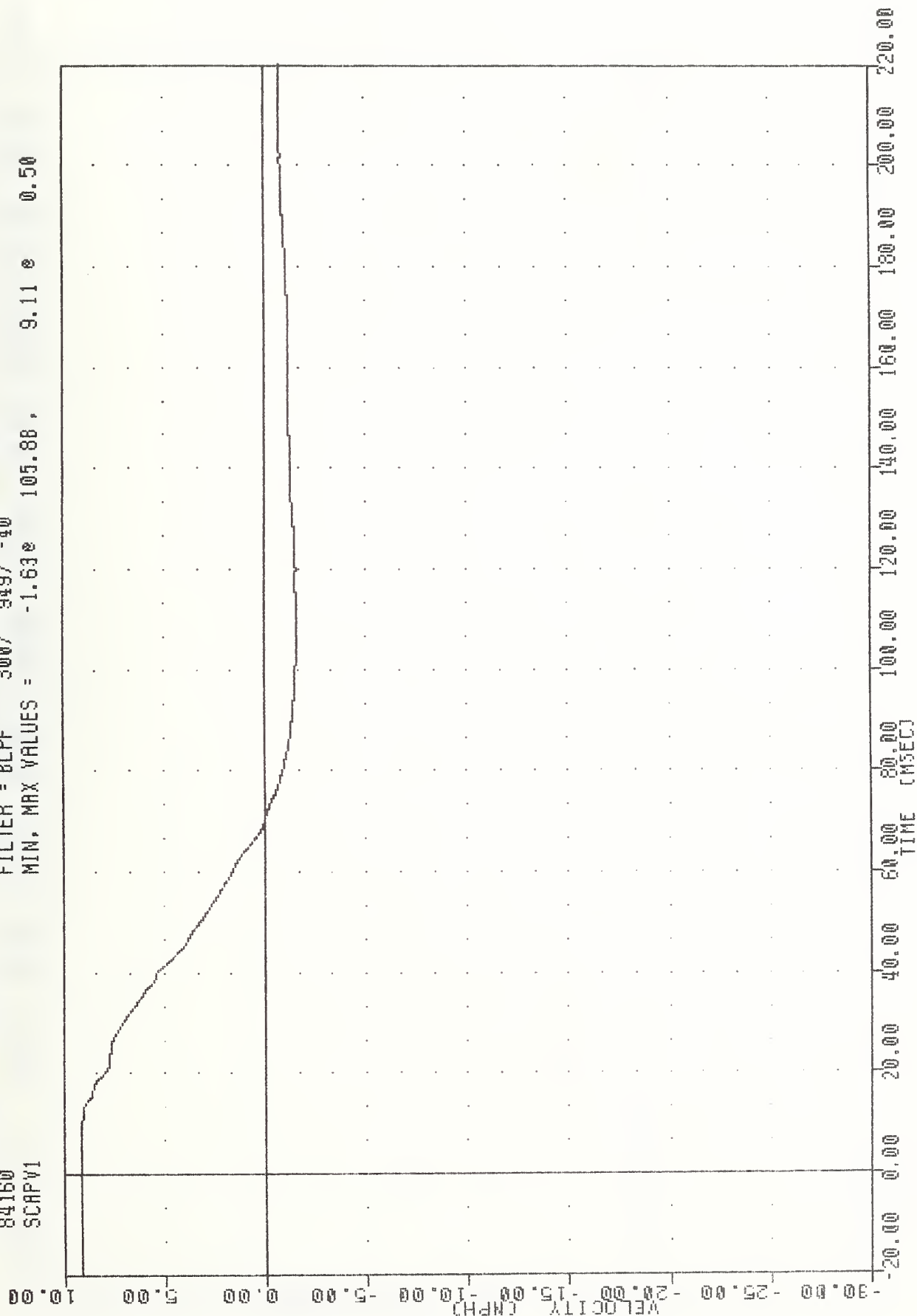
FORD LTD INTO FIXED BARRIER
STEERING COLUMN ACCELERATION LOWER

9.1 MPH 840608
AIR BAG DEMONSTRATION
84160
SCAPV1

PLOT DATE 26-JUN-84 13:37:18

FILTER = 8LPF 300/ 949/ -40

MIN, MAX VALUES = -1.63e 105.88, 9.11 e 0.50



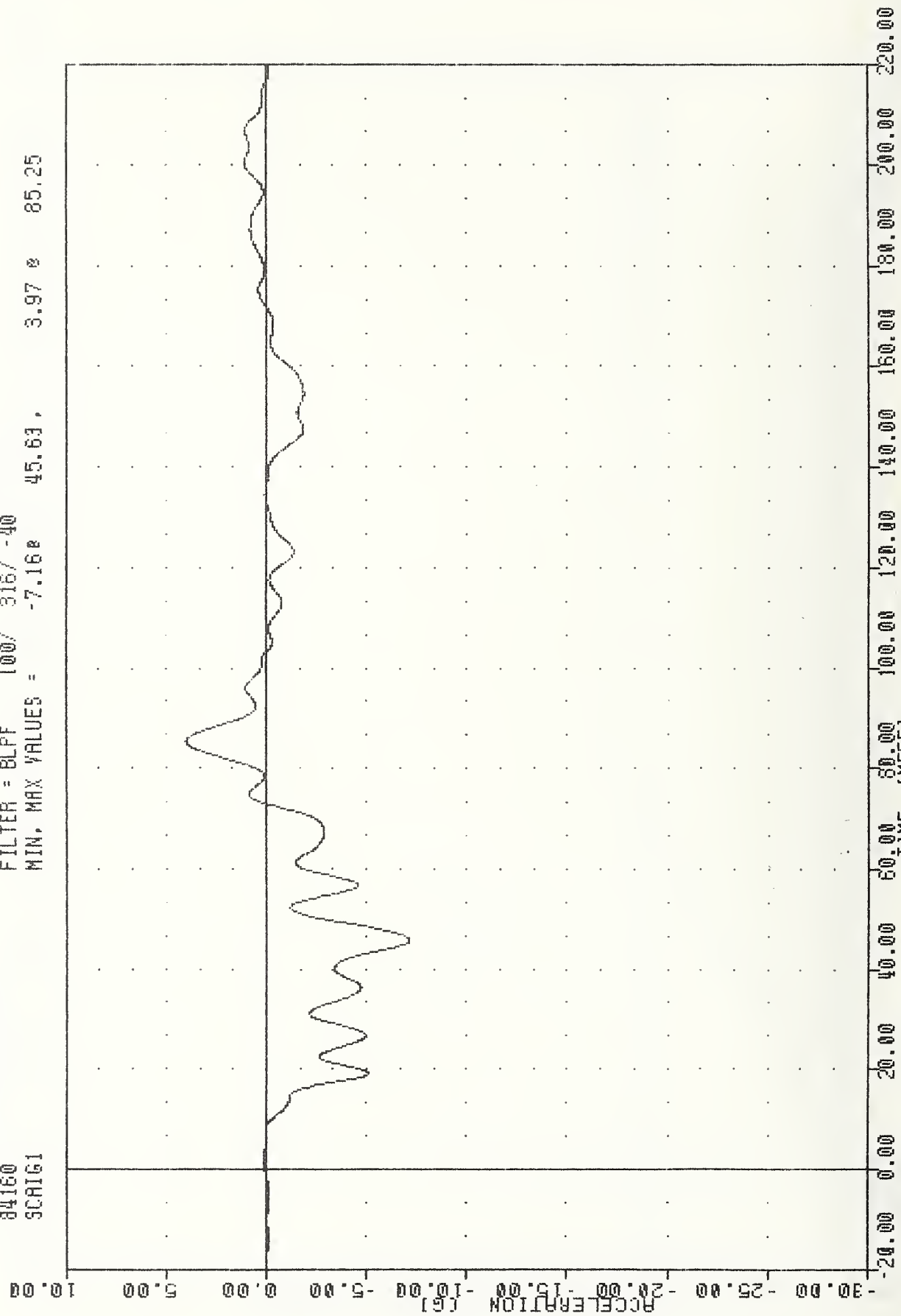
FORD LTD INTO FIXED BARRIER
DELTA V USING SCAPG1

9.1 MPH
AIR BAG DEMONSTRATION
84160
SCR161

PLOT DATE 13-JUN-84 13:53:23

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = -7.16e 45.63, 3.97 e 85.25



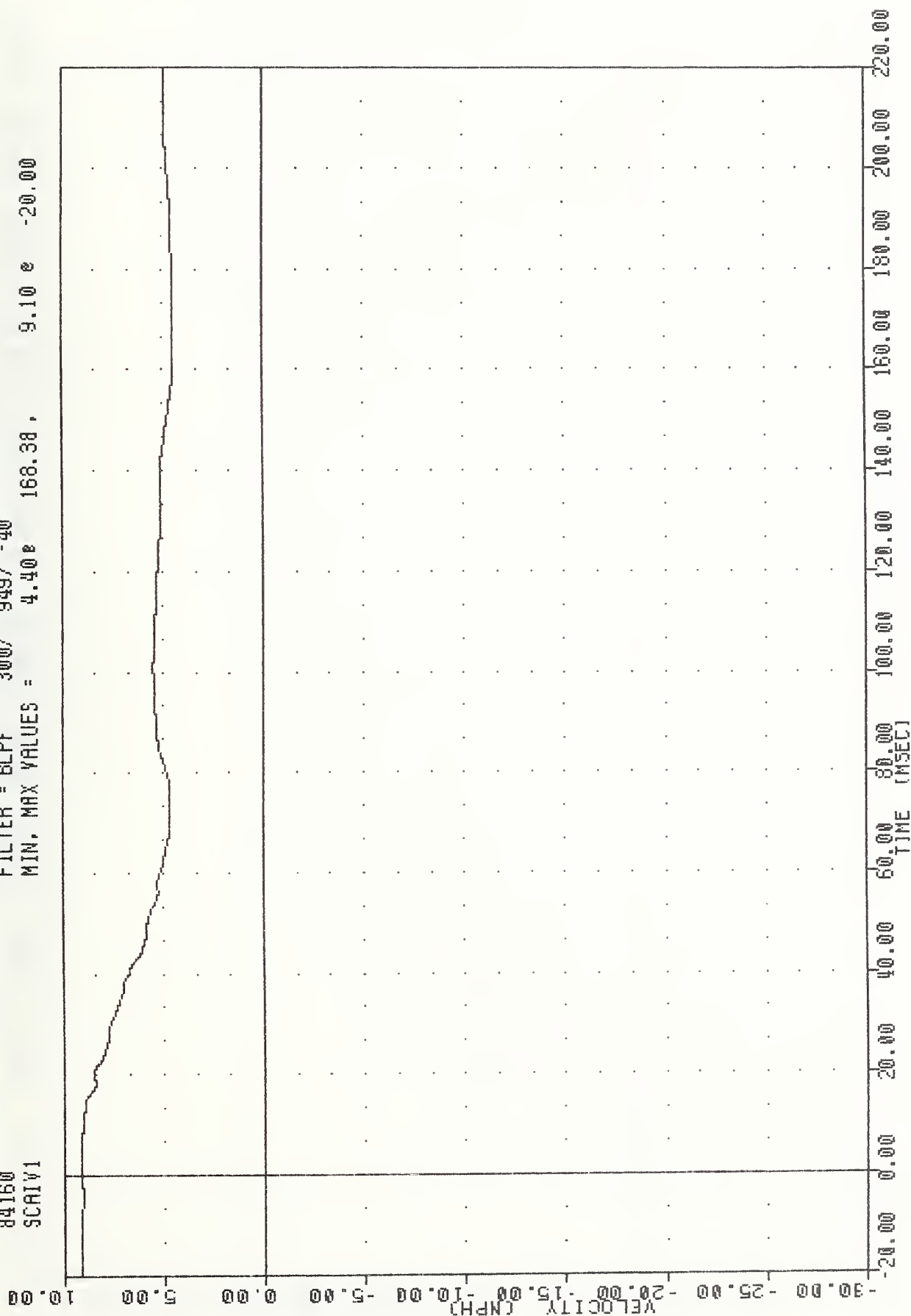
FORD LTD INTO FIXED BARRIER
STEERING COLUMN ACCELERATION LOWER

9.1 MPH
AIR BAG DEMONSTRATION
84160
SCAIV1

PLU1 DATE 10-JUL-04 10:14:52

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = 4.408 168.38, 9.10 e -20.00



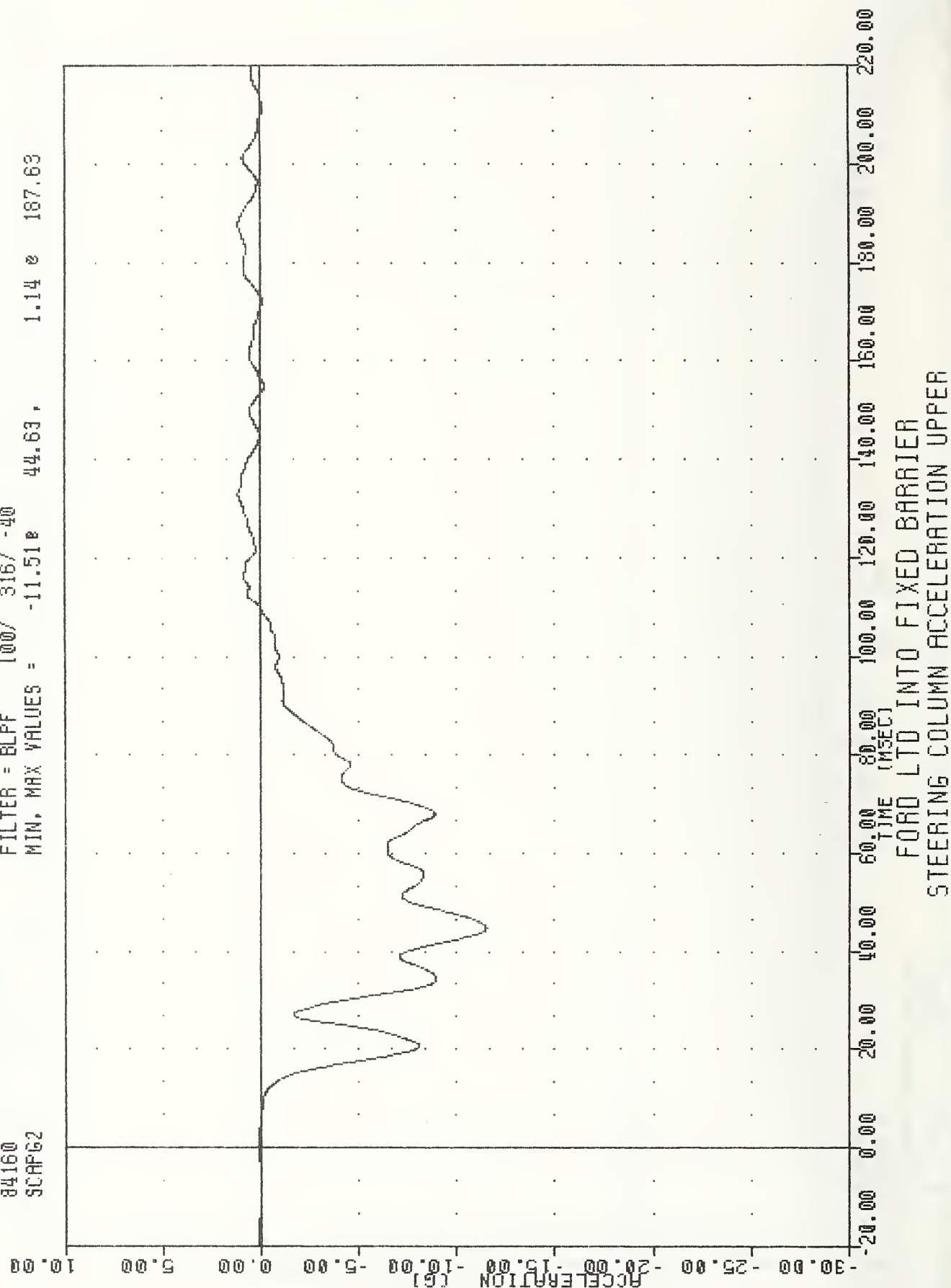
FORD LTD INTO FIXED BARRIER
DELTA V USING SCAIG1

9.1 MPH , 840608
AIR BAG DEMONSTRATION
84160
SCAPG2

PLOT DATE 13-JUN-84 13:53:23

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = -11.51 44.63 , 1.14 187.63

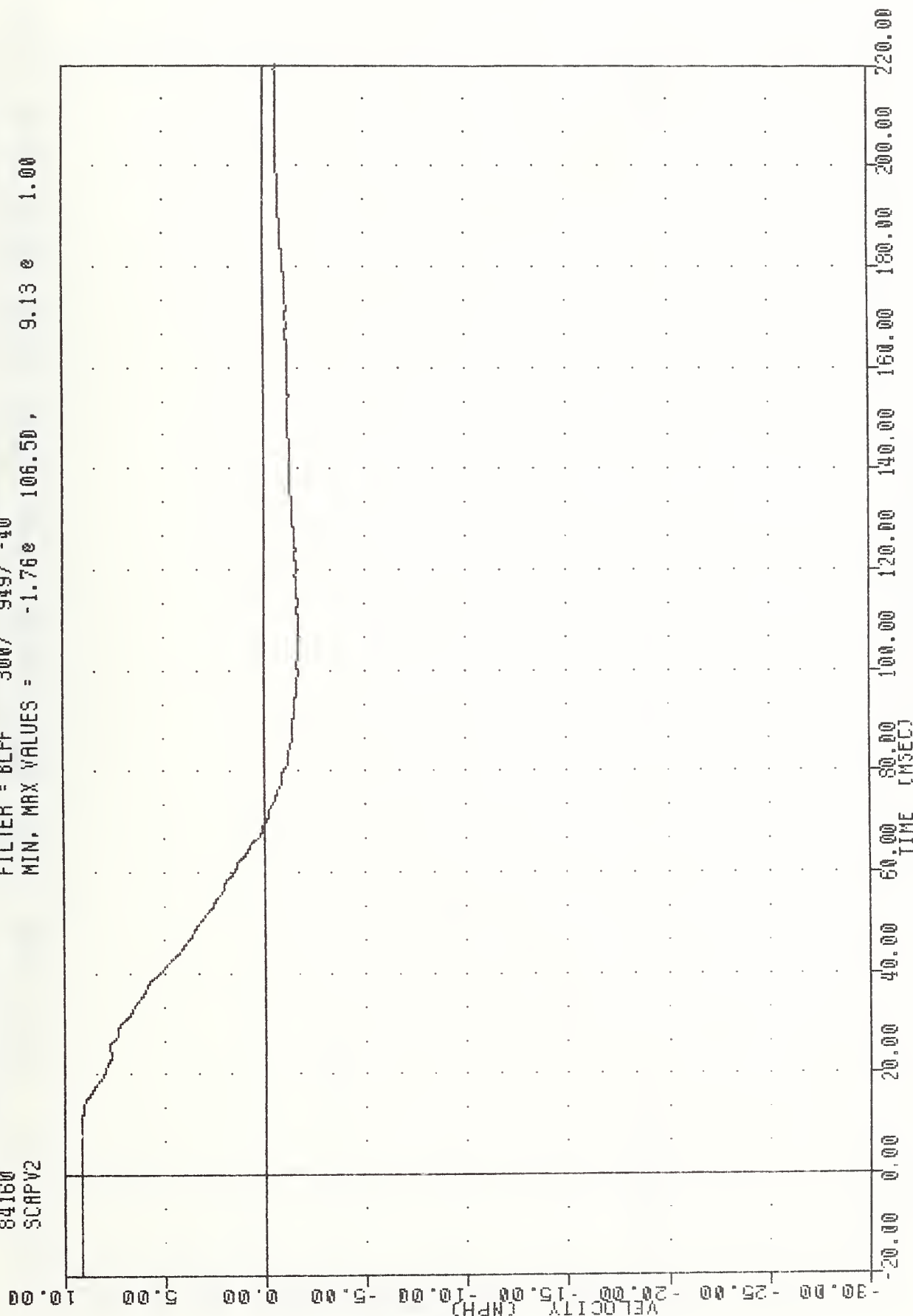


9.1 MPH , 840608
AIR BAG DEMONSTRATION
84160
SCAPV2

PLOT DATE 18-JUL-84 16:14:52

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = -1.76e 106.50, 9.13 e 1.00



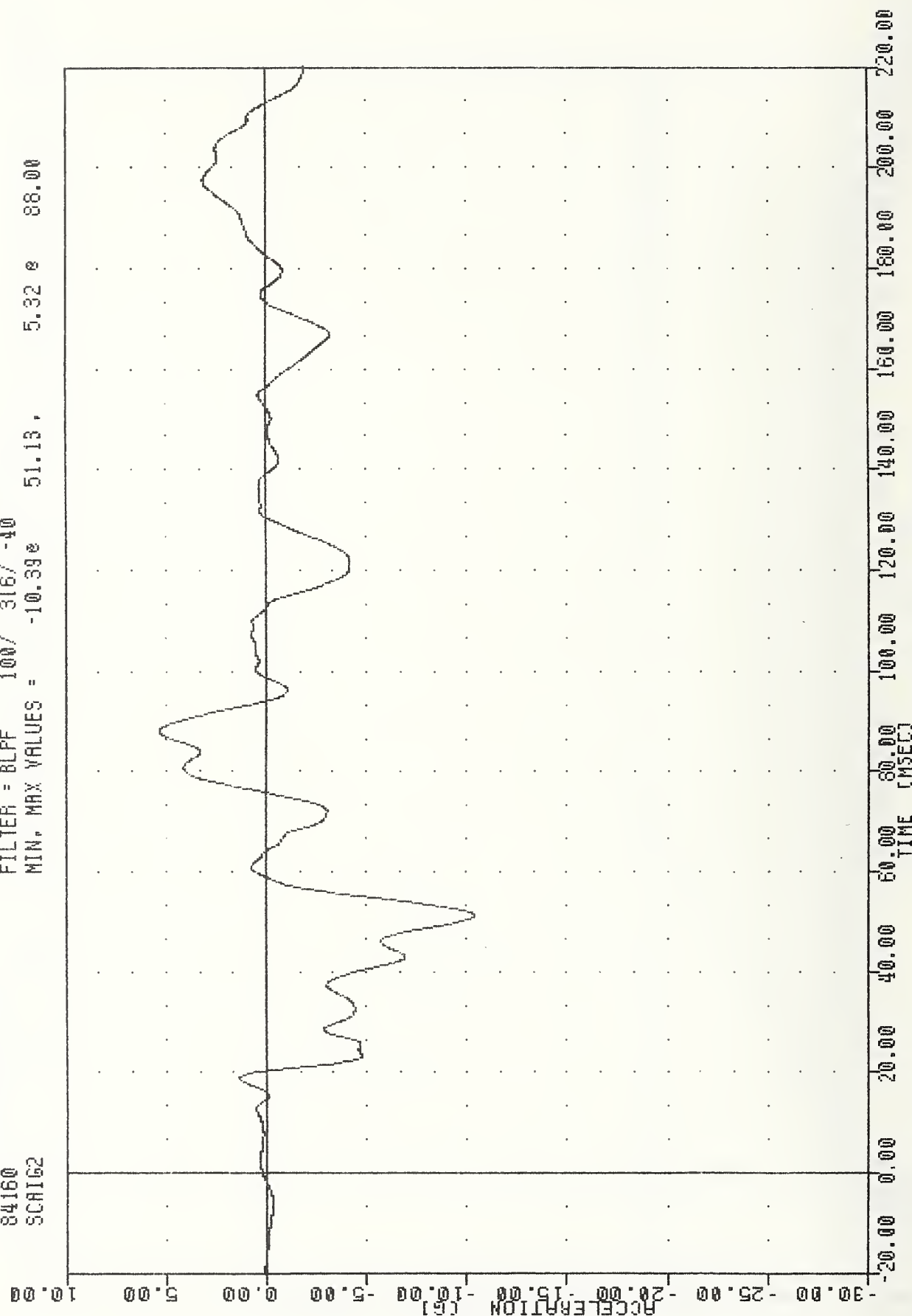
FORD LTD INTO FIXED BARRIER
DELTA V USING SCAP62

9.1 MPH , 840608
AIR BAG DEMONSTRATION
84160
SCA162

PLOT DATE 13-JUN-84 13:53:23

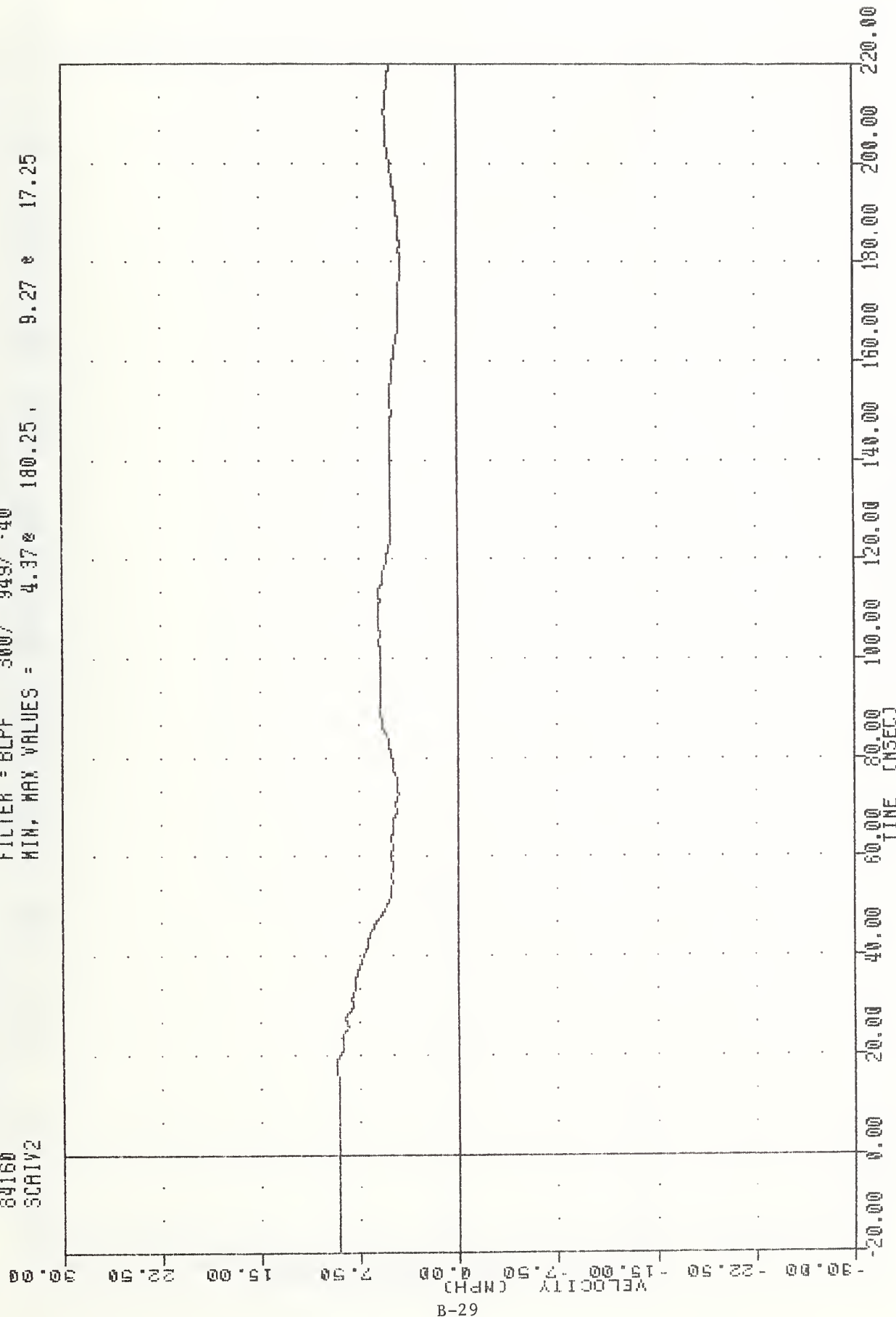
FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = -10.39e 51.13 , 5.32 e 88.00



FORD LTD INTO FIXED BARRIER
STEERING COLUMN ACCELERATION UPPER

9.1 MPH 041600
 AIR BAG DEMONSTRATION
 04160
 SCRAIV2
 PLU1 DATE 16-JUL-64 10:14:52
 FILTER = BLPF 300/ 949/ -40
 MIN, MAX VALUES = 4.37 180.25, 9.27 17.25



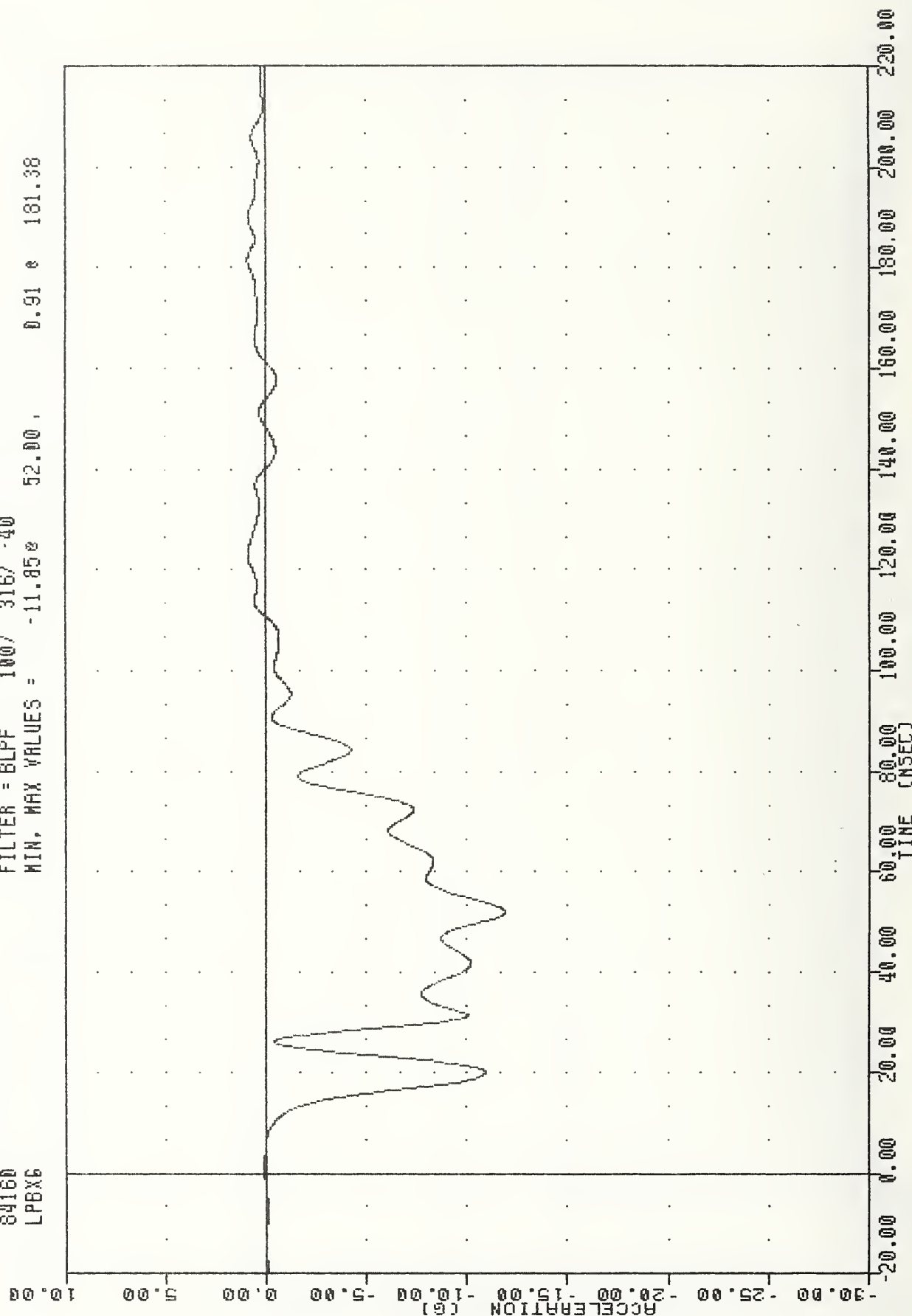
FORD LTD INTO FIXED BARRIER
 DELTA V USING SCRAIG2

9.1 MPH , 840600
AIR BAG DEMONSTRATION
84160
LPBX6

PLU1 DATE 13-JUN-84 13:53:23

FILTER = BLPF 100/ 316/ -40

MIN, MAX VALUES = -11.850 52.00, 0.91 0 181.38



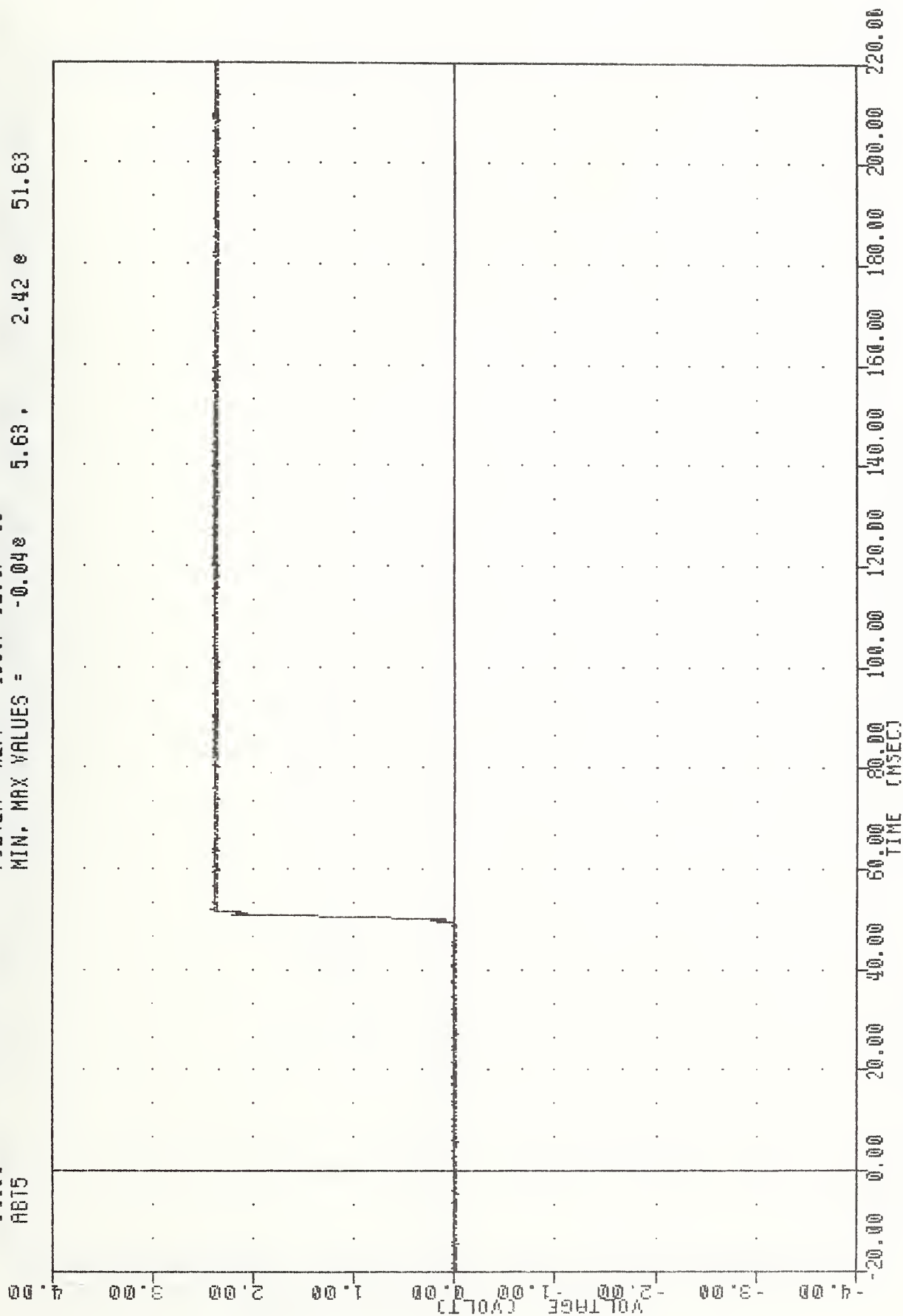
FORD LTD INTO FIXED BARRIER
PILLAR LEFT B ACCELERATION X AXIS

9.1 MPH 840608
 AIR BAG DEMONSTRATION
 84160
 ABT5

PLUF DATE 13-JUN-84 13:53:23

FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = -0.048 5.63, 2.42 e 51.63



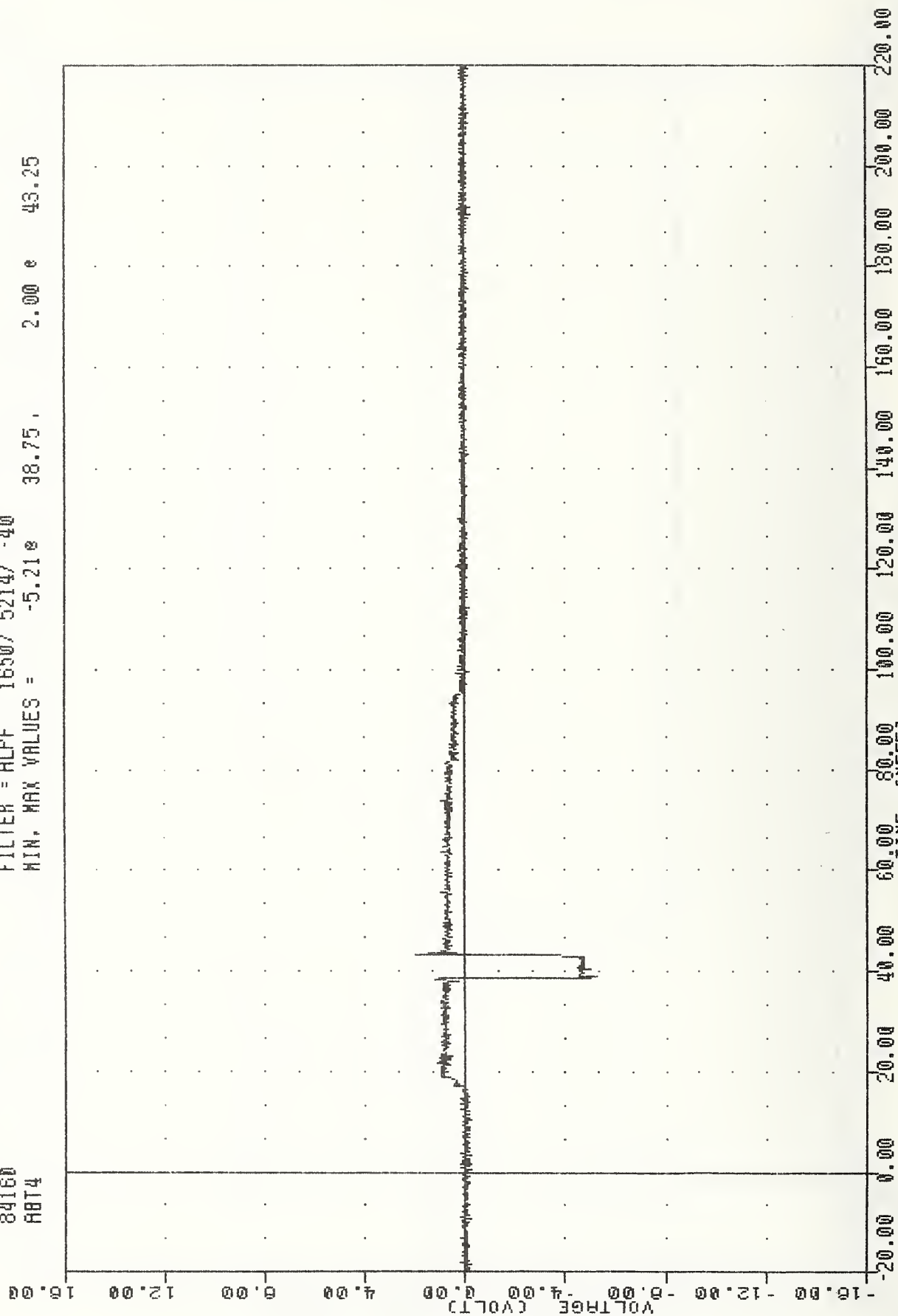
FORD LTD INTO FIXED BARRIER
 BREED SWITCH

9.1 MPH 840608
 AIR BAG DEMONSTRATION
 84160
 APT4

PLOT DATE 13-JUN-84 13:53:23

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -5.21e 38.75 , 2.00 e 43.25



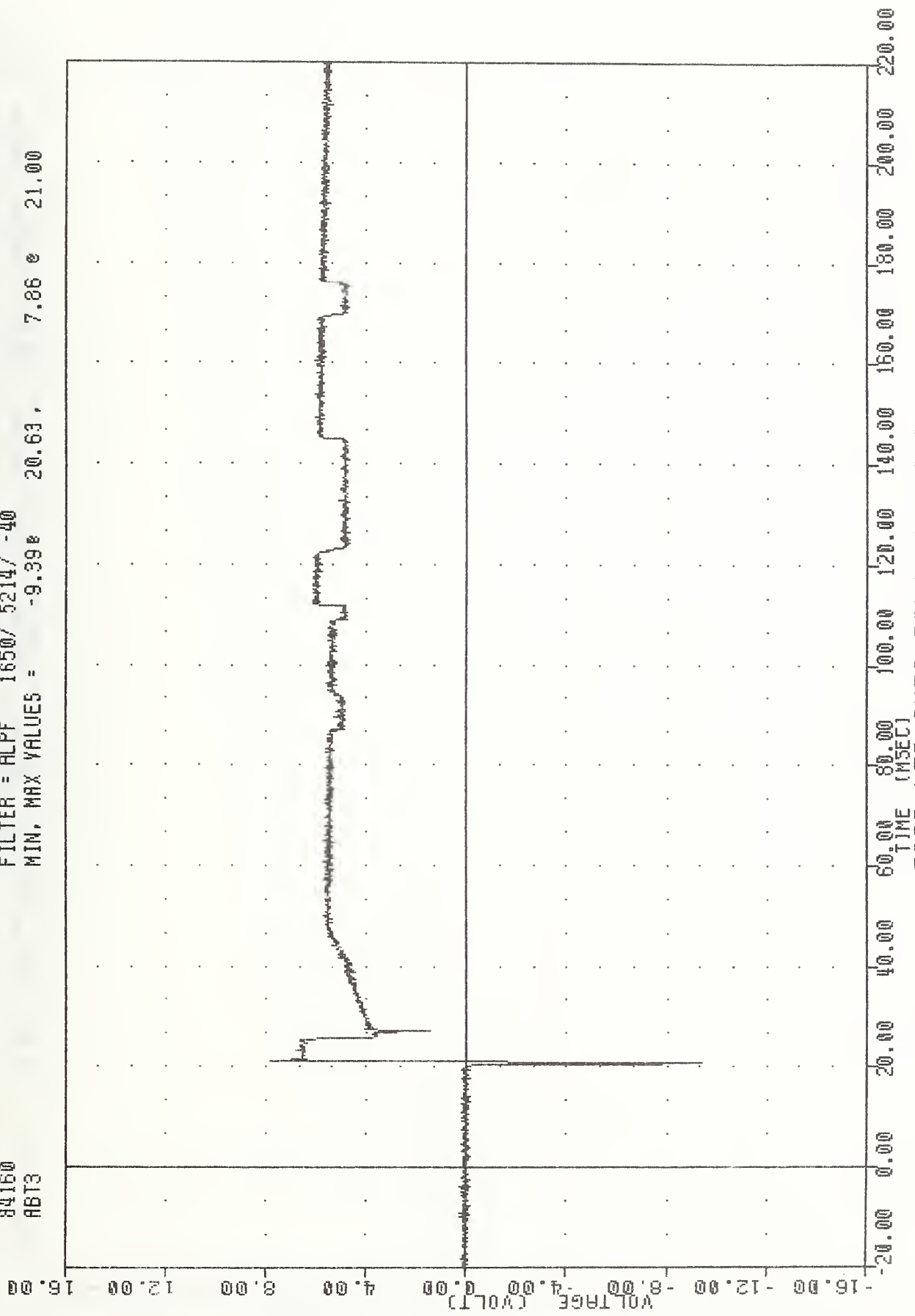
FORD LTD INTO FIXED BARRIER
 HIGH LEVEL SW

9.1 MPH , 840608
AIR BAG DEMONSTRATION
84160
ABT3

PLOT DATE 13-JUN-84 13:53:23

FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = -9.39% 20.63, 7.86 @ 21.00

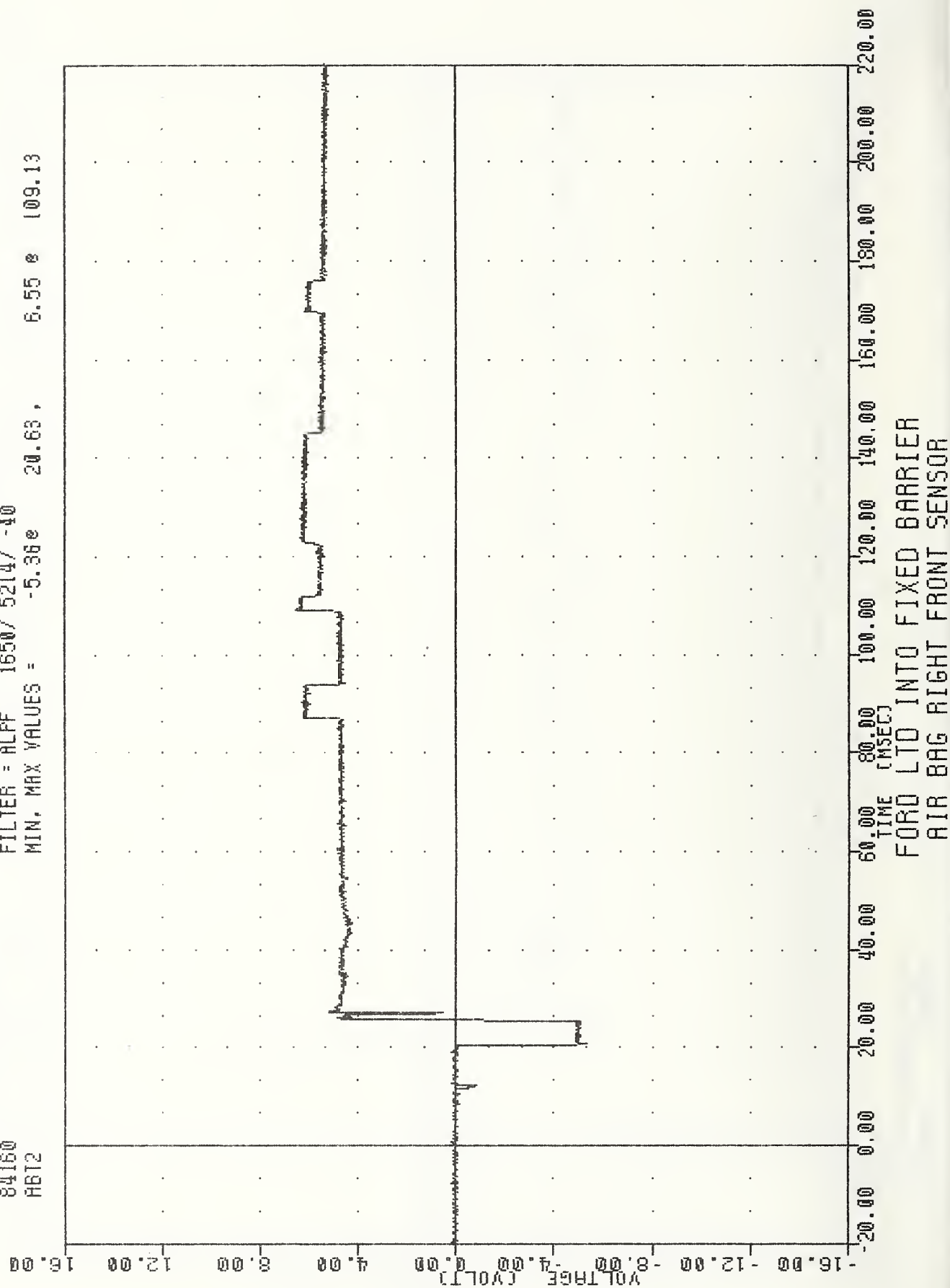


9.1 MPH , 840608
AIR BAG DEMONSTRATION
84160
ABT2

PLOT DATE 13-JUN-84 13:53:23

FILTER = ALPF 1650/ 5214/ -40

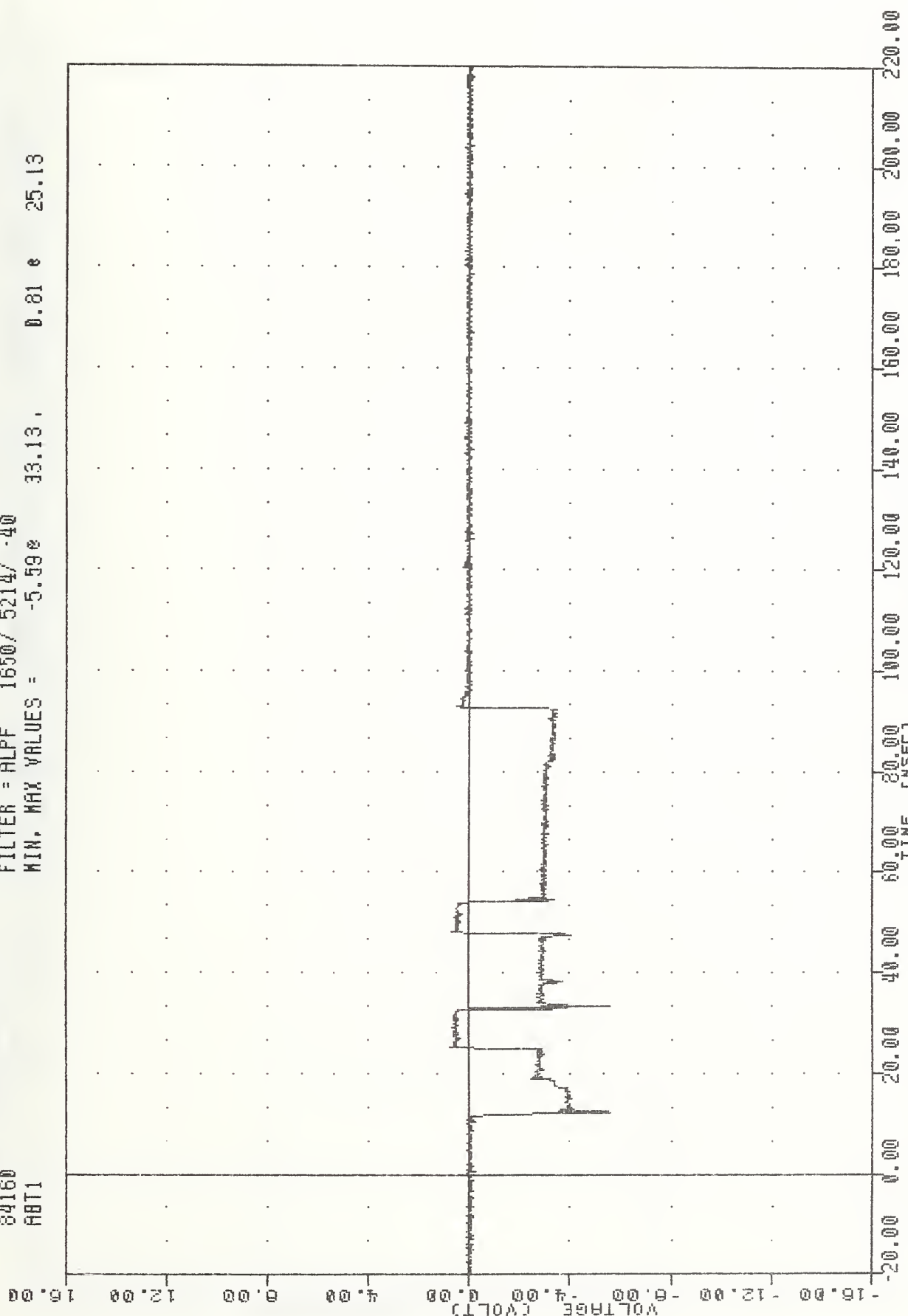
MIN. MAX VALUES = -5.36e 20.63, 6.55 e 109.13



9.1 MPH , 840503
 AIR BAG DEMONSTRATION
 84160
 ABT1

PL01 DATE 13-JUN-84 13:53:23

FILTER = ALPF 1650/ 5214/ -40
 MIN. MAX VALUES = -5.59e 33.13, 0.81 e 25.13



FORD LTD INTO FIXED BARRIER
 AIR BAG LEFT FRONT SENSOR

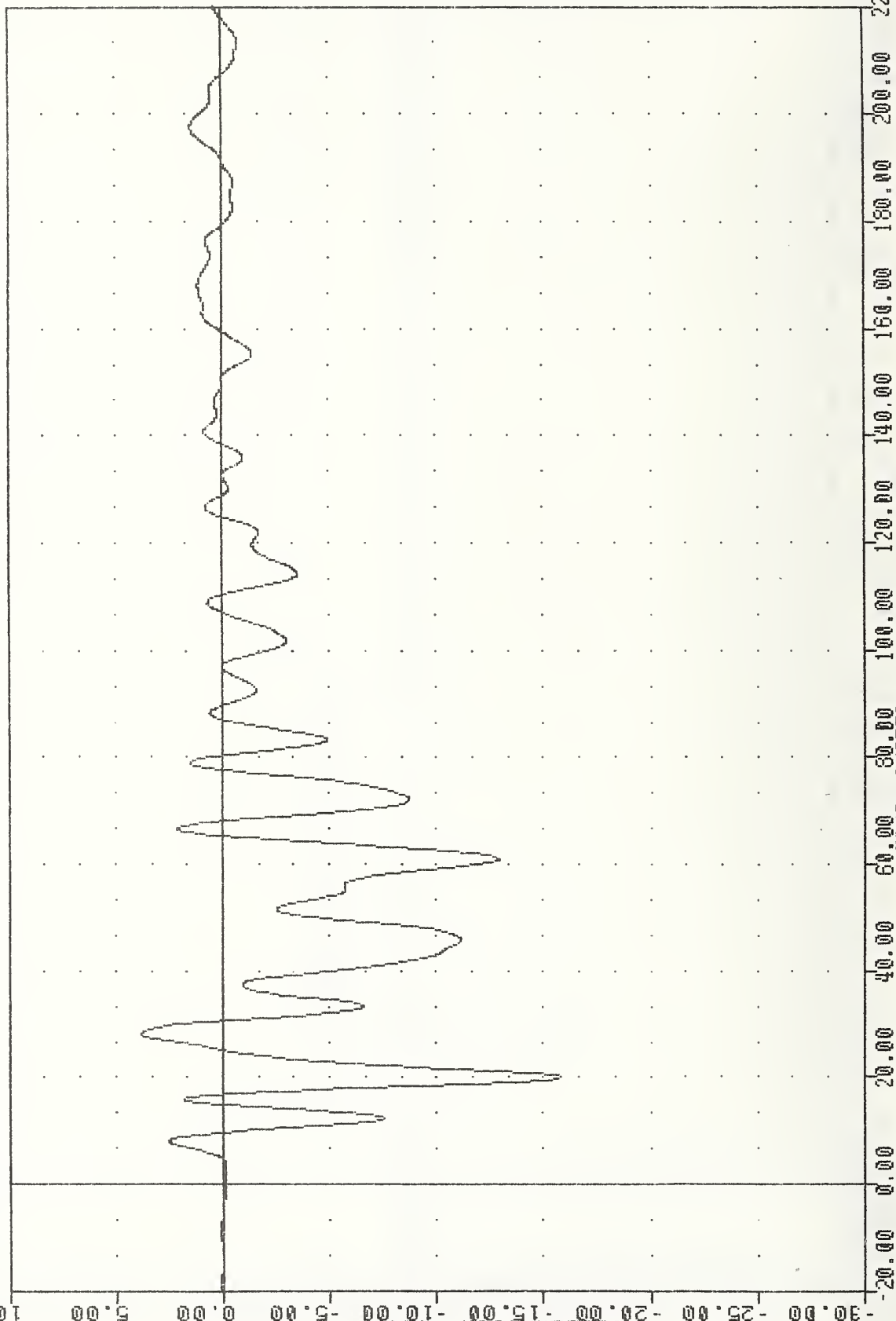
7.1 MPH
AIR BAG DEMONSTRATION
84163
FFCXGL

PLU1 DATE 13-JUN-84 13:54:09

FILTER = 8LPF 100/ 316/ -40

MIN. MAX VALUES = -15.850 20.00 3.78 27.60

ACCELERATION (G)



FORD LTD INTO FIXED BARRIER
LEFT FRONT FRAME X-MEMBER ACCEL X AXIS

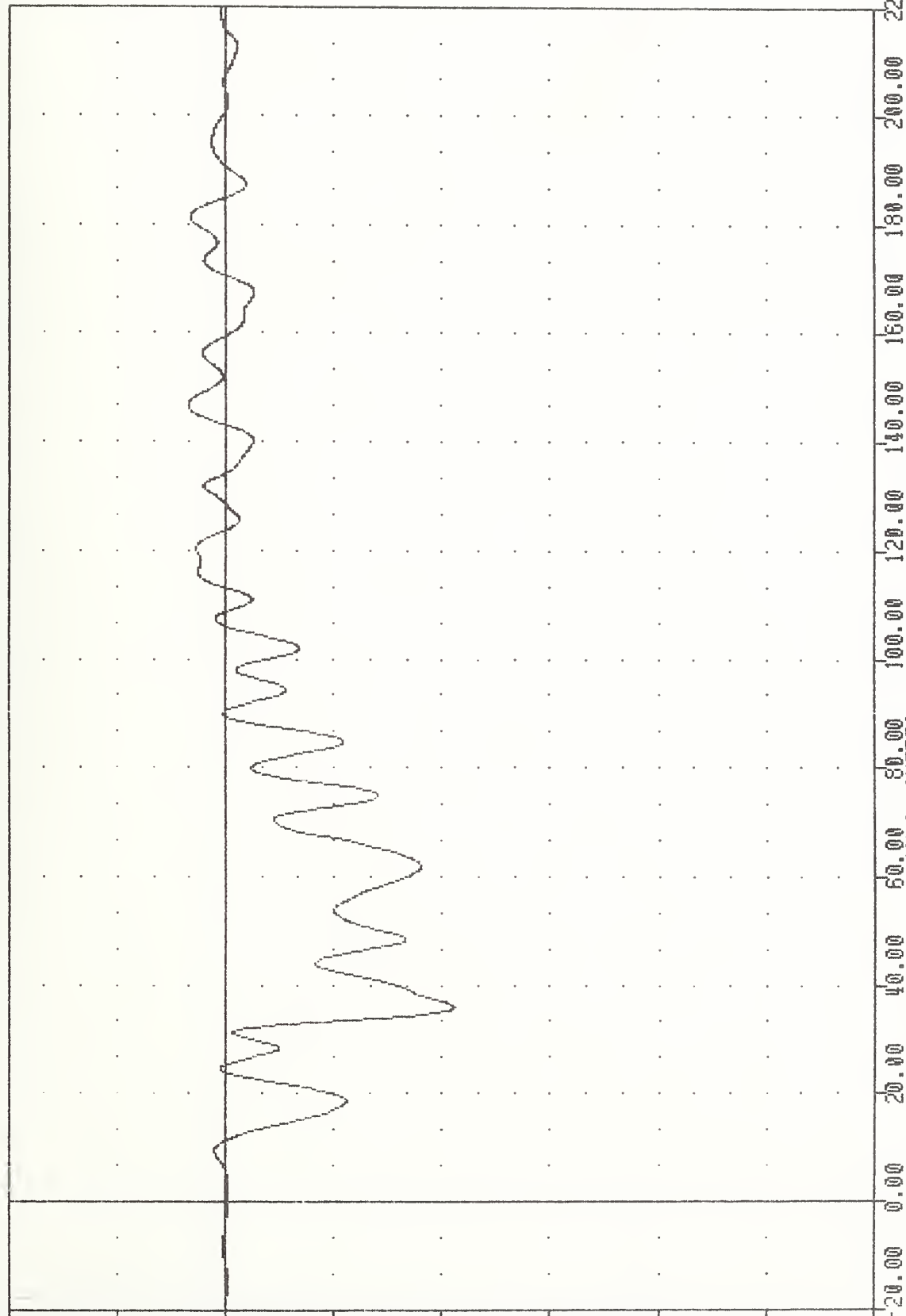
7.1 MPH 840611
AIR BAG DEMONSTRATION
84163
FFCXGR

PLUF DATE 13-JUN-84 13:54:09

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = -10.57e 35.88, 1.74 e 146.50

ACCELERATION (G)



FORD LTD INTO FIXED BARRIER
RIGHT FRONT FRAME X-MEMBER ACCEL X AXIS

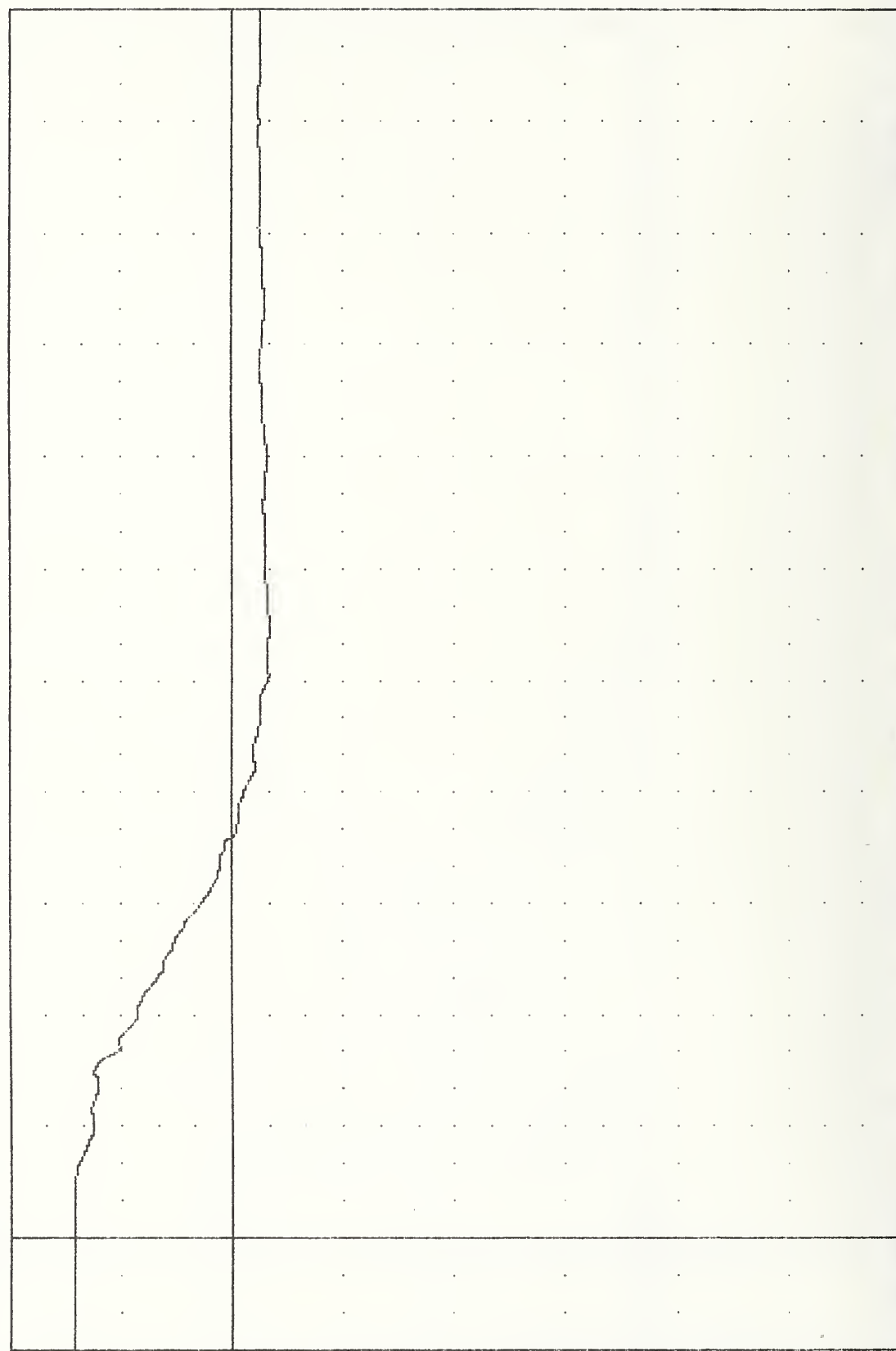
7.1 MPH 840611
AIR BAG DEMONSTRATION
84163
FFCXVR

PLUI DATE 26-JUN-84 13:37:36

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = -1.75e 109.75, 7.13 e 8.38

10.00
5.00
0.00
-5.00
-10.00
-15.00
-20.00
-25.00
-30.00
VELOCITY (MPH)

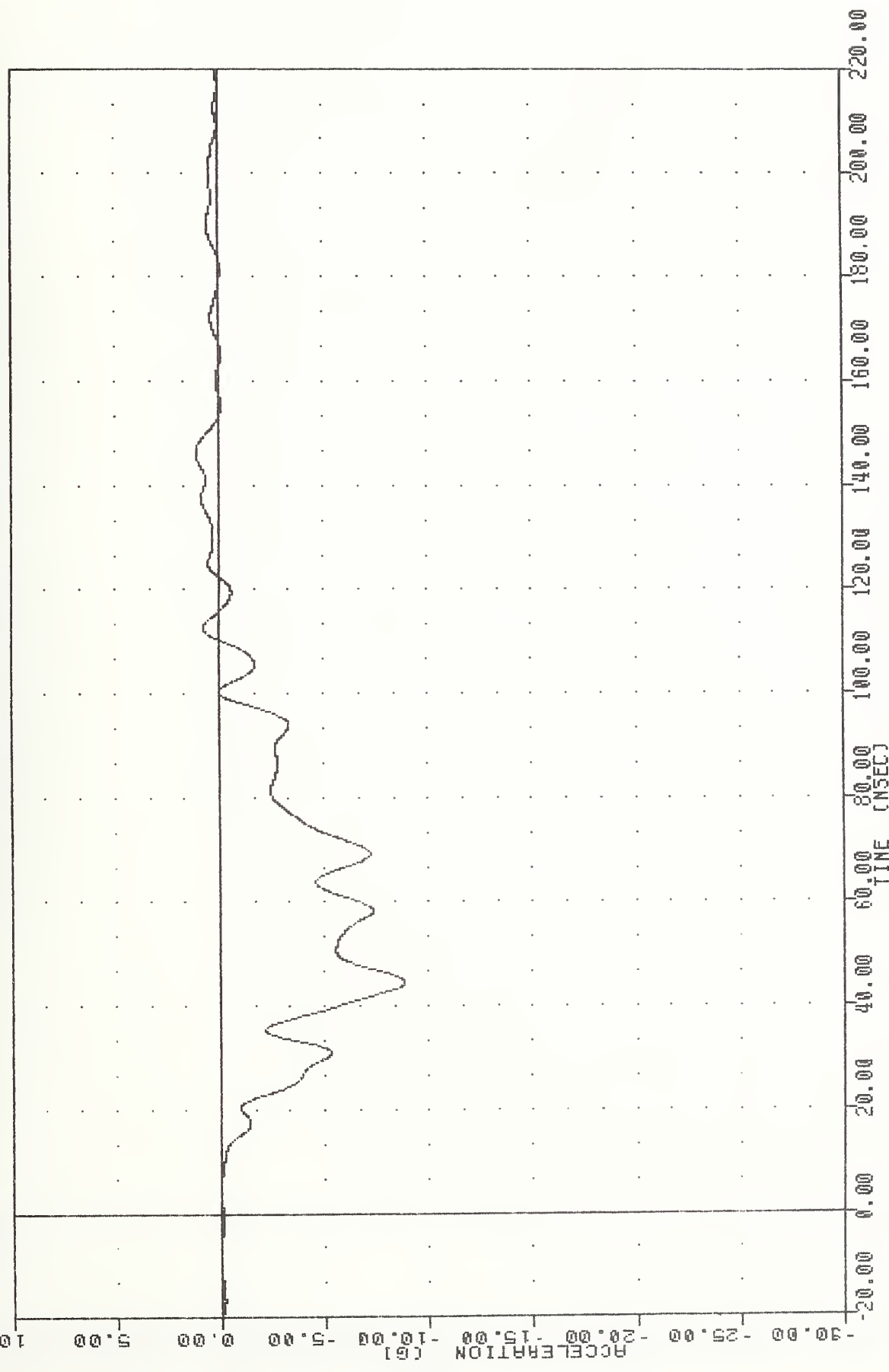


60.00 80.00 100.00 120.00 140.00 160.00 180.00 200.00 220.00
TIME (MSEC)

FORD LTD INTO FIXED BARRIER
DELTA V USING FFCXGR

FLU1 081c 13-JUN-04 13:54:03
 FILTER = BLPF 100/ 316/ -40
 MIN. MAX VALUES = 44.38 , 1.09 e 146.25

7.1 MPH 040611
 AIR BAG DEMONSTRATION
 84163
 SCAP61



FORD LTD INTO FIXED BARRIER
 STEERING COLUMN ACCELERATION LOWER

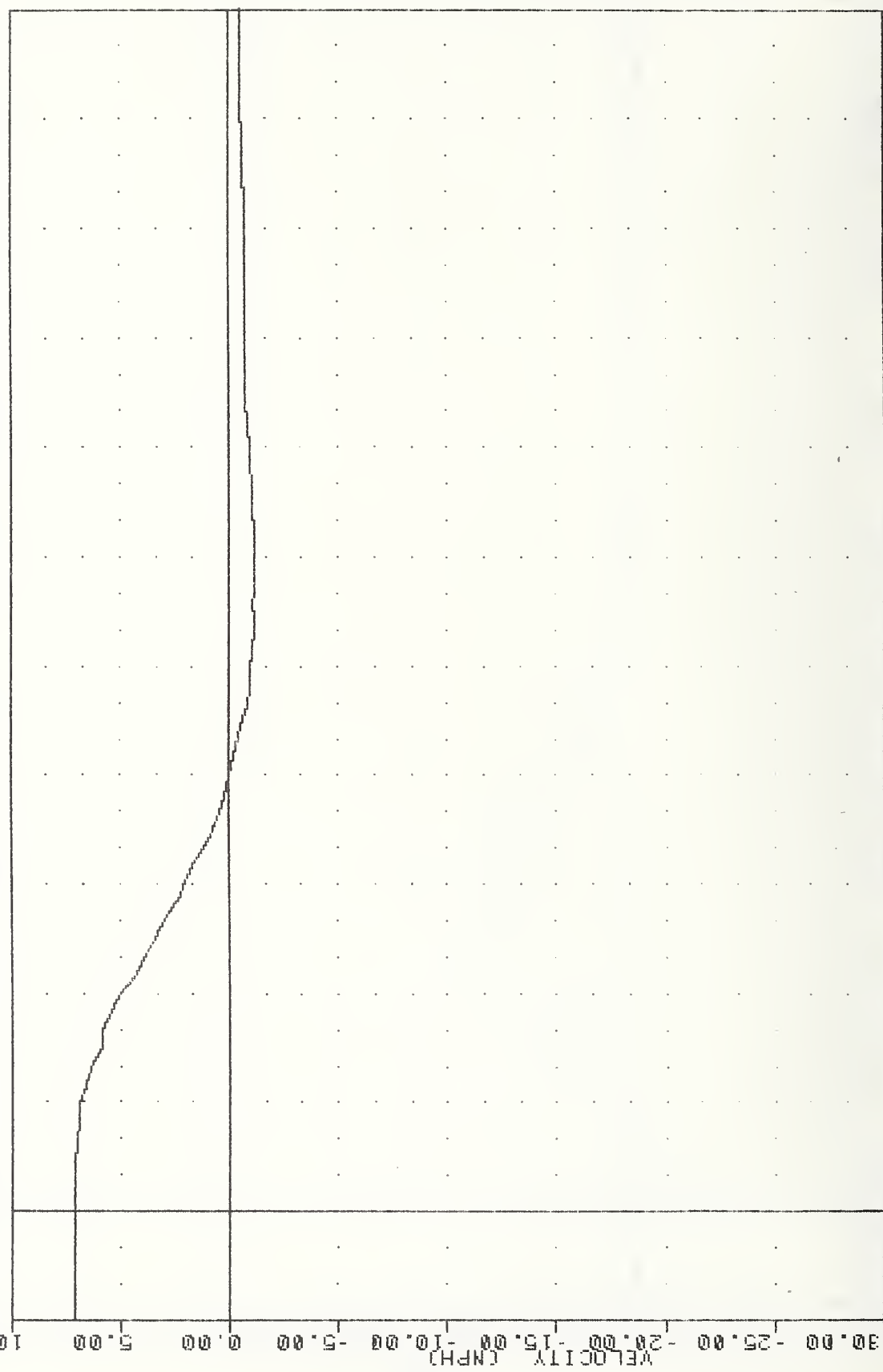
7.1 MPH 840611
 AIR BAG DEMONSTRATION
 84163
 SCAPV1

PLOT DATE 26-JUN-84 13:37:36

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = -1.18e 118.88, 7.10 e -20.00

10.00



B-40

60.00 80.00 100.00 120.00 140.00 160.00 180.00 200.00 220.00

TIME (MSEC)
 FORD LTD INTO FIXED BARRIER
 DELTA V USING SCAPG1

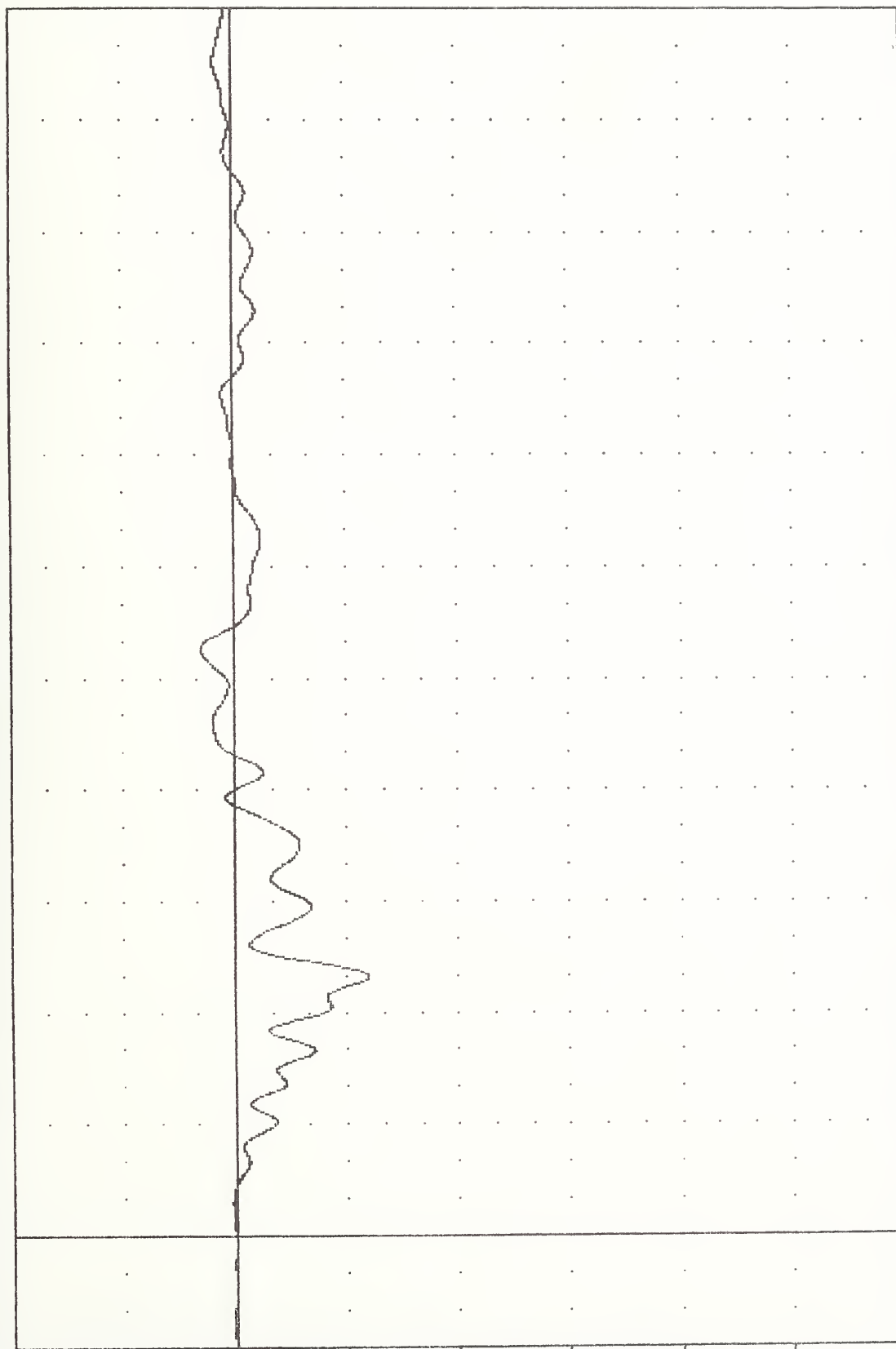
7.1 MPH , 840611
AIR BAG DEMONSTRATION
84163
5CA1G1

FLU1 D11C 15-JUN-04 13:54:03

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = -5.98e 46.25, 1.51 e 105.25

ACCELERATION (G)



TIME (MSEC)

FORD LTD INTO FIXED BARRIER
STEERING COLUMN ACCELERATION LOWER

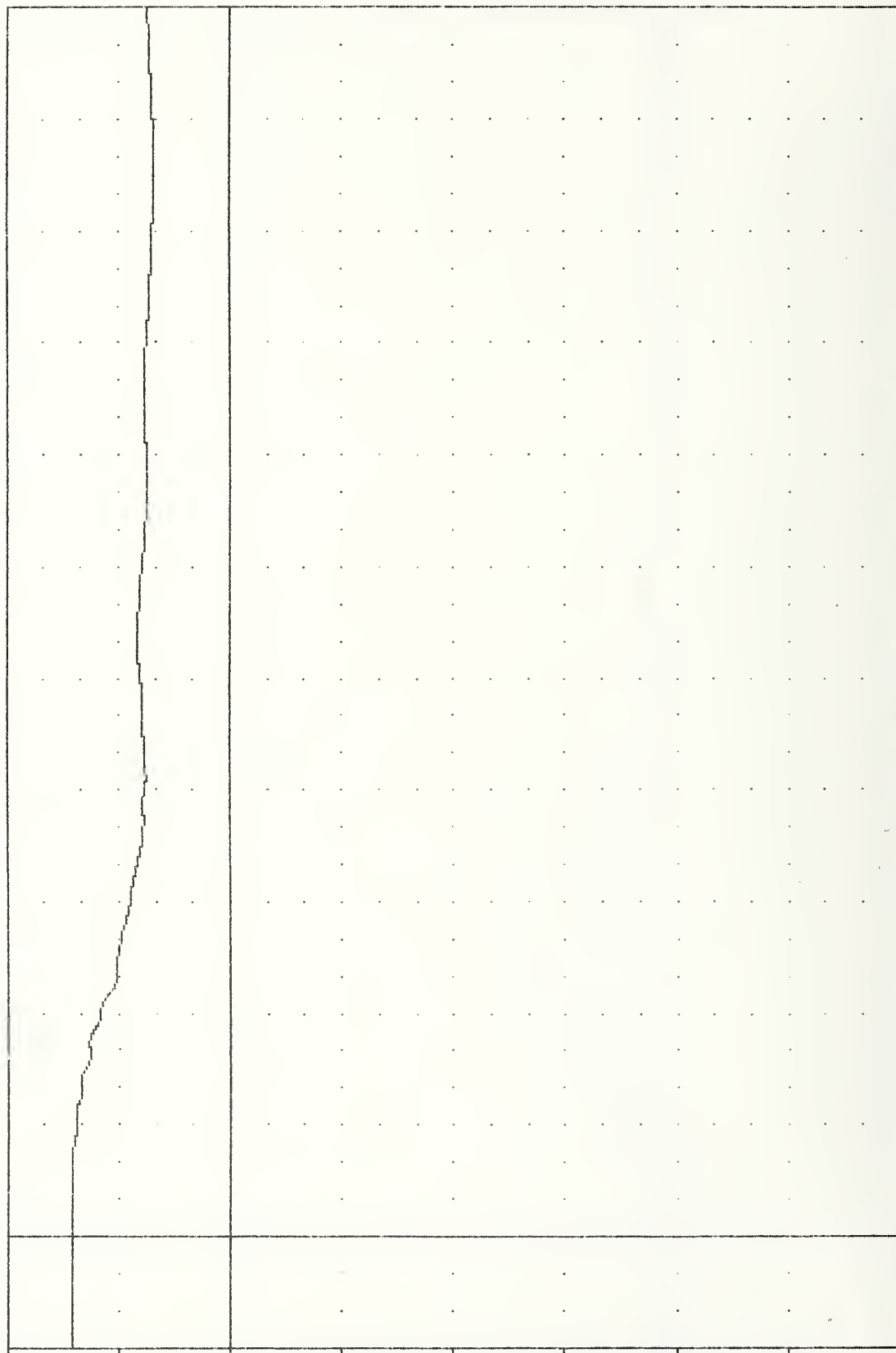
7.1 MPH
ATA BAG DEMONSTRATION
84163
SCRIW1

PLC, DATA 10 JUL 77 10:15:00

FILTER = BLPF 300/ 949/ -40

MIN, MAX VALUES = 3.370 186.75, 7.13 6.50

VELOCITY (MPH)



TIME (MSEC)

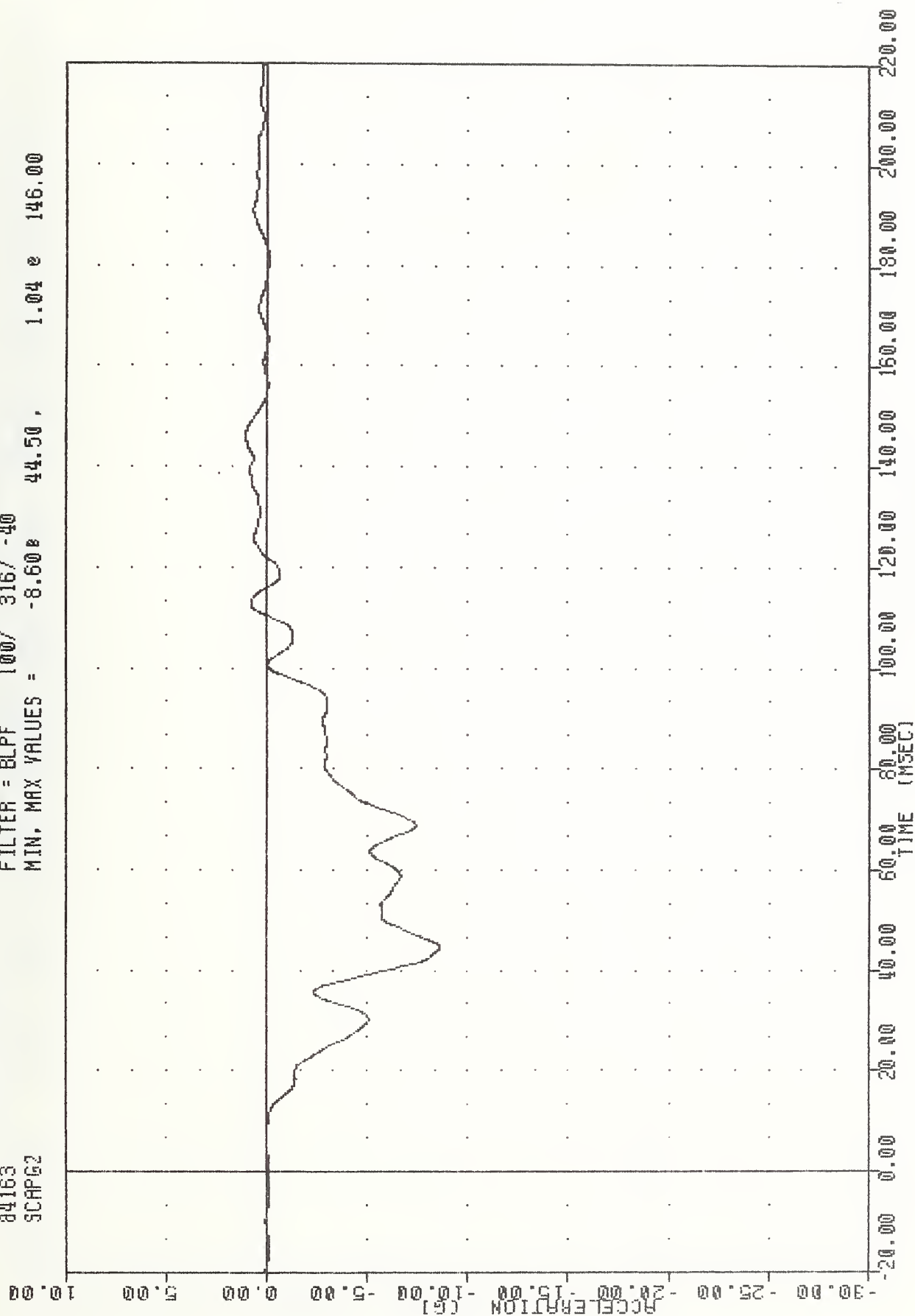
FORD LTD INTO FIXED BARRIER
DELTA V USING SCAIG1

7.1 MPH , 840611
AIR BAG DEMONSTRATION
84163
SCAPG2

PLOT DATE 13-JUN-84 13:54:09

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = -8.60 44.50 , 1.04 e 146.00



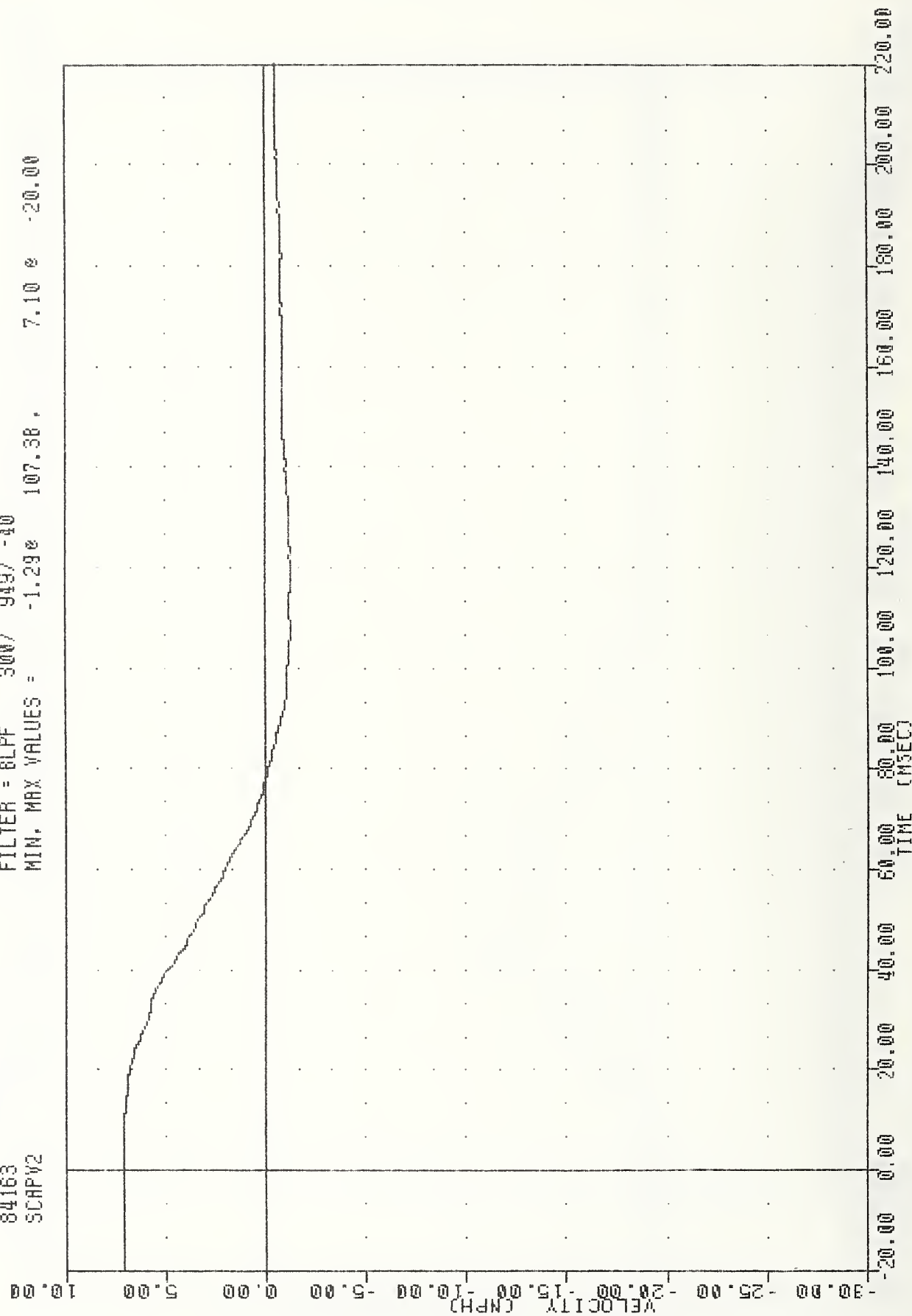
FORD LTD INTO FIXED BARRIER
STEERING COLUMN ACCELERATION UPPER

7.1 MPH 840611
AIR BAG DEMONSTRATION
84163
SCAPV2

PLU1 DATE 16-JUL-84 16:15:31

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = -1.29e 107.38, 7.10 e -20.00

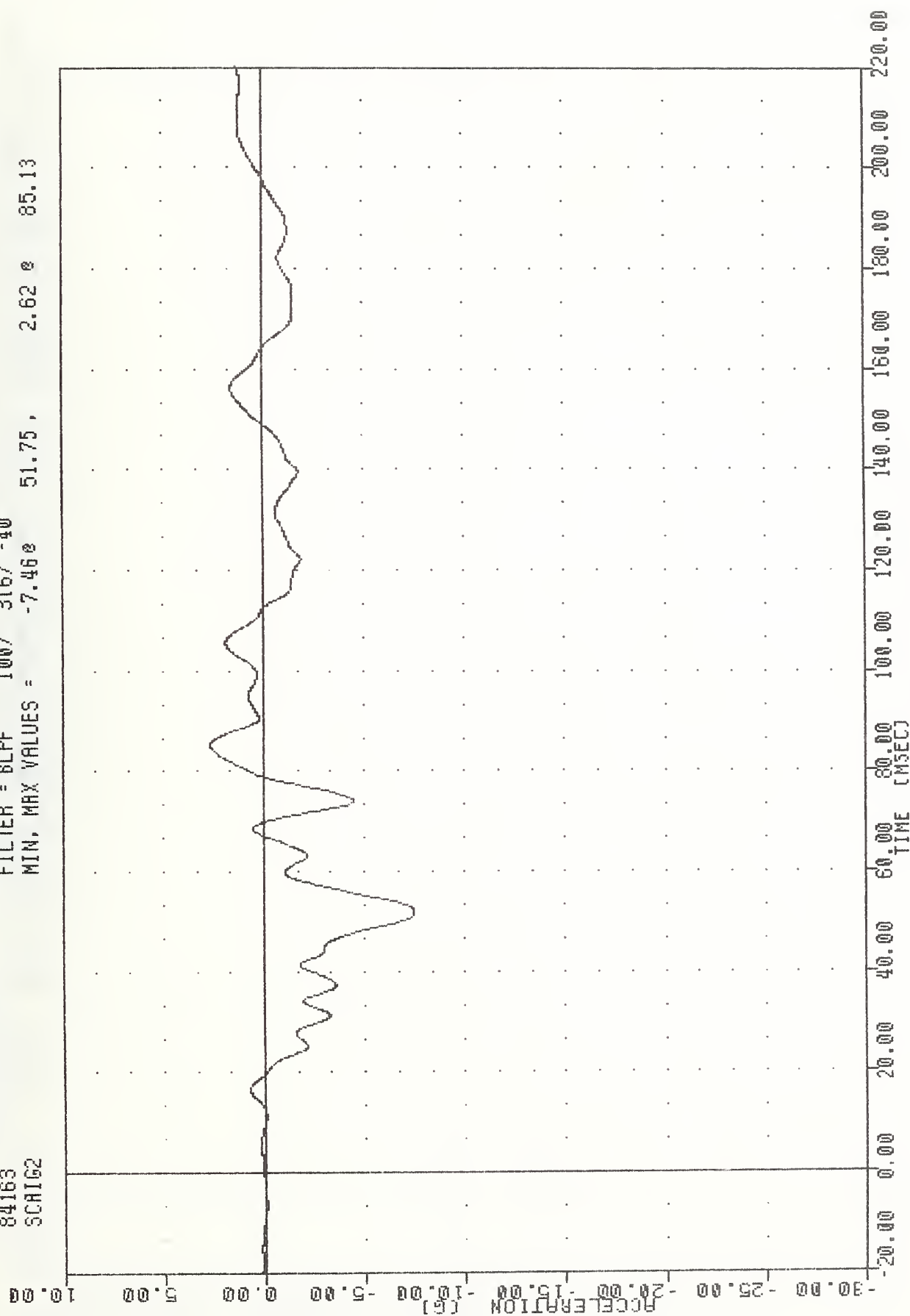


FORD LTD INTO FIXED BARRIER
DELTA V USING SCAP62

7.1 MPH 840611
AIR BAG DEMONSTRATION
84163
SCAIG2

PLOT DATE 13-JUN-84 13:54:09

FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -7.460 51.75, 2.62 85.13



FORD LTD INTO FIXED BARRIER
STEERING COLUMN ACCELERATION UPPER

7.1 MPH
AIR BAG DEMONSTRATION
84163
SCAIV2

PL01 JAIL 16 JUL-64 10:15:31

FILTER = BLPF 300/ 949/ -40

MIN. MAX VALUES = 3.18 194.00 7.22 15.50

VELOCITY (MPH)

30.00

22.50

15.00

7.50

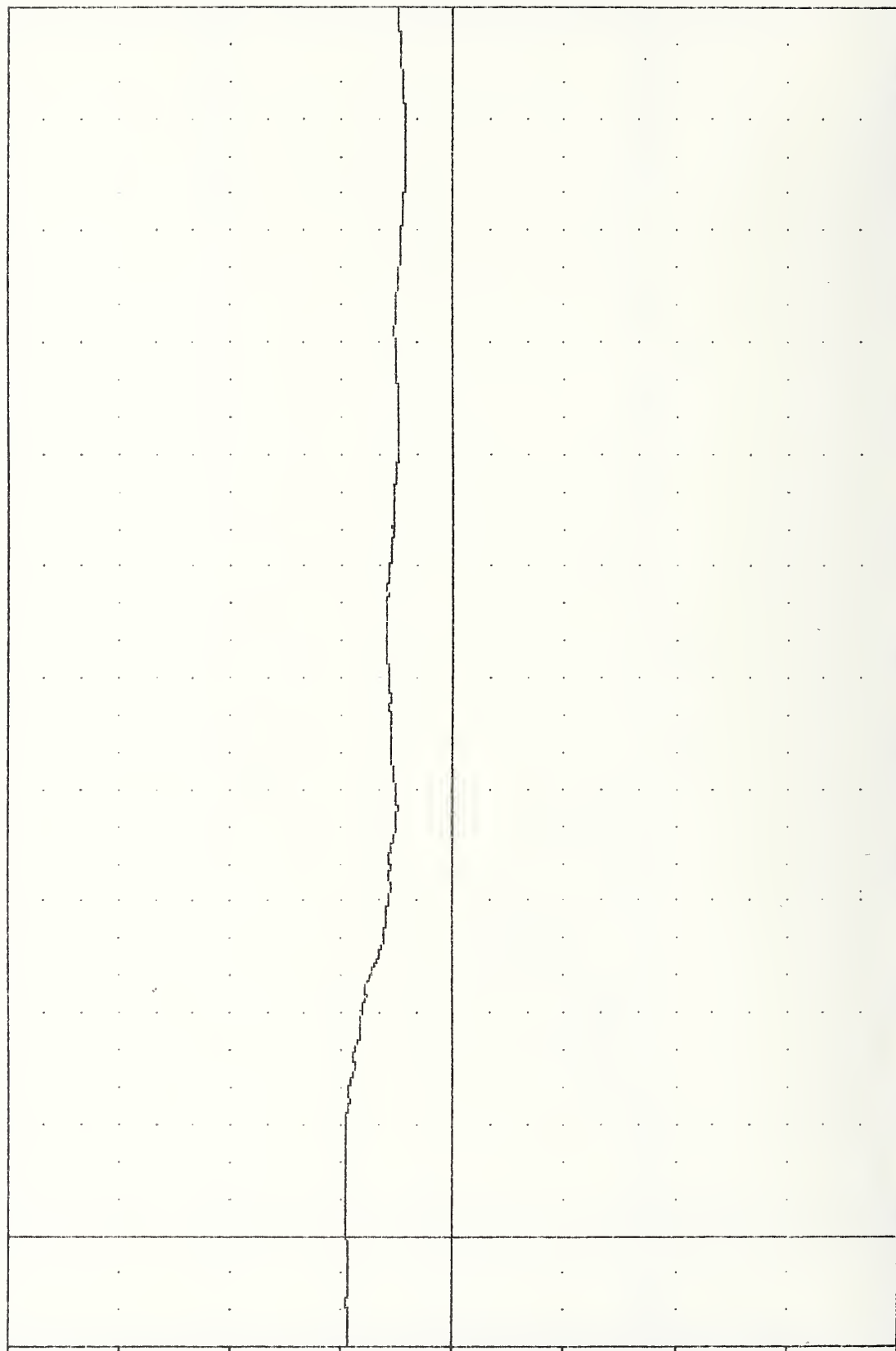
0.00

-7.50

-15.00

-22.50

-30.00



TIME (MSEC)

FORD LTD INTO FIXED BARRIER

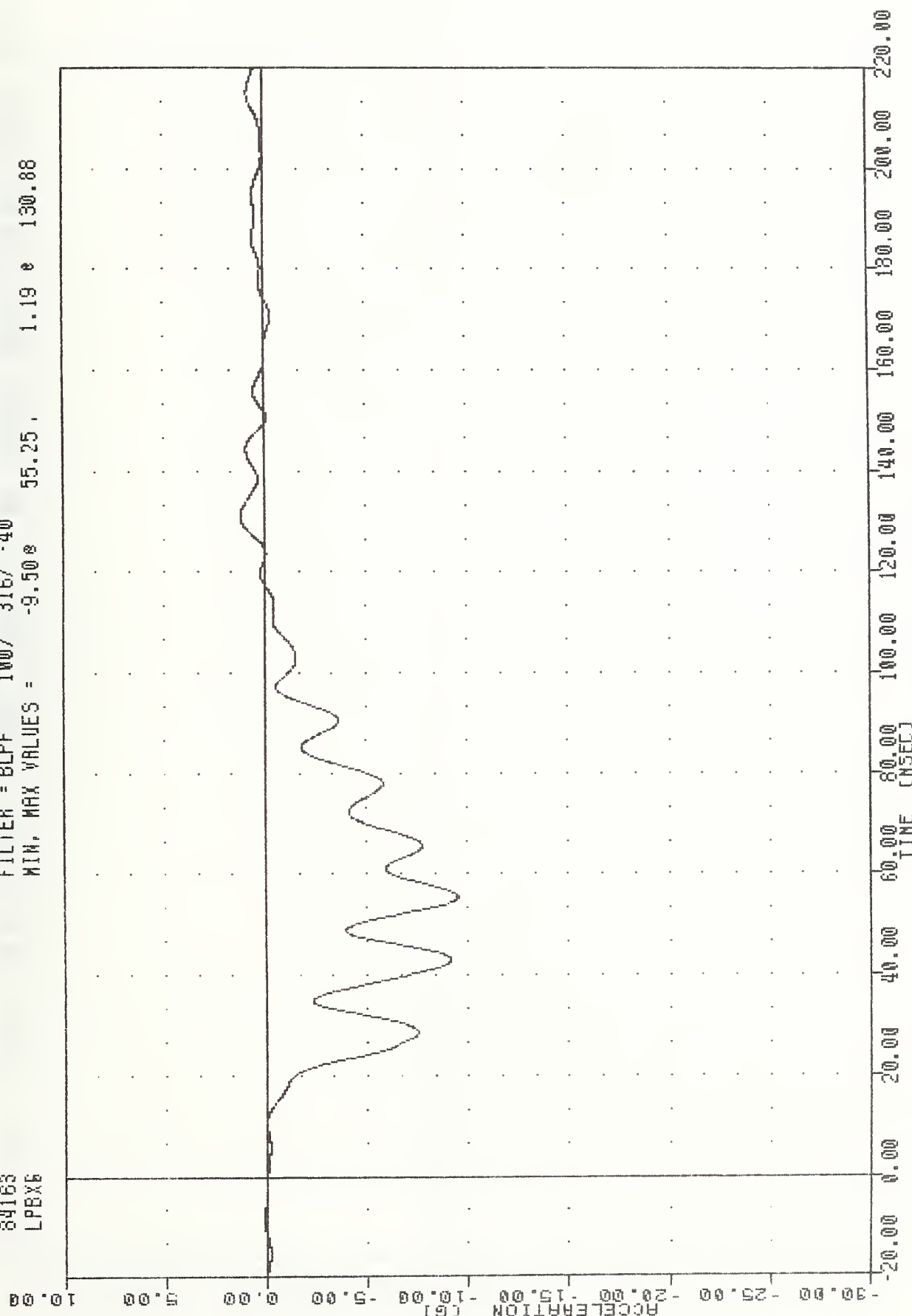
DELTA V USING SCAIG2

7.1 MPH , 840611
AIR BAG DEMONSTRATION
84163
LPBX6

PLOT DATE 13-JUN-84 13:54:09

FILTER = BLPF 100/ 316/ -40

MIN, MAX VALUES = -9.50s 55.25, 1.19 e 130.88



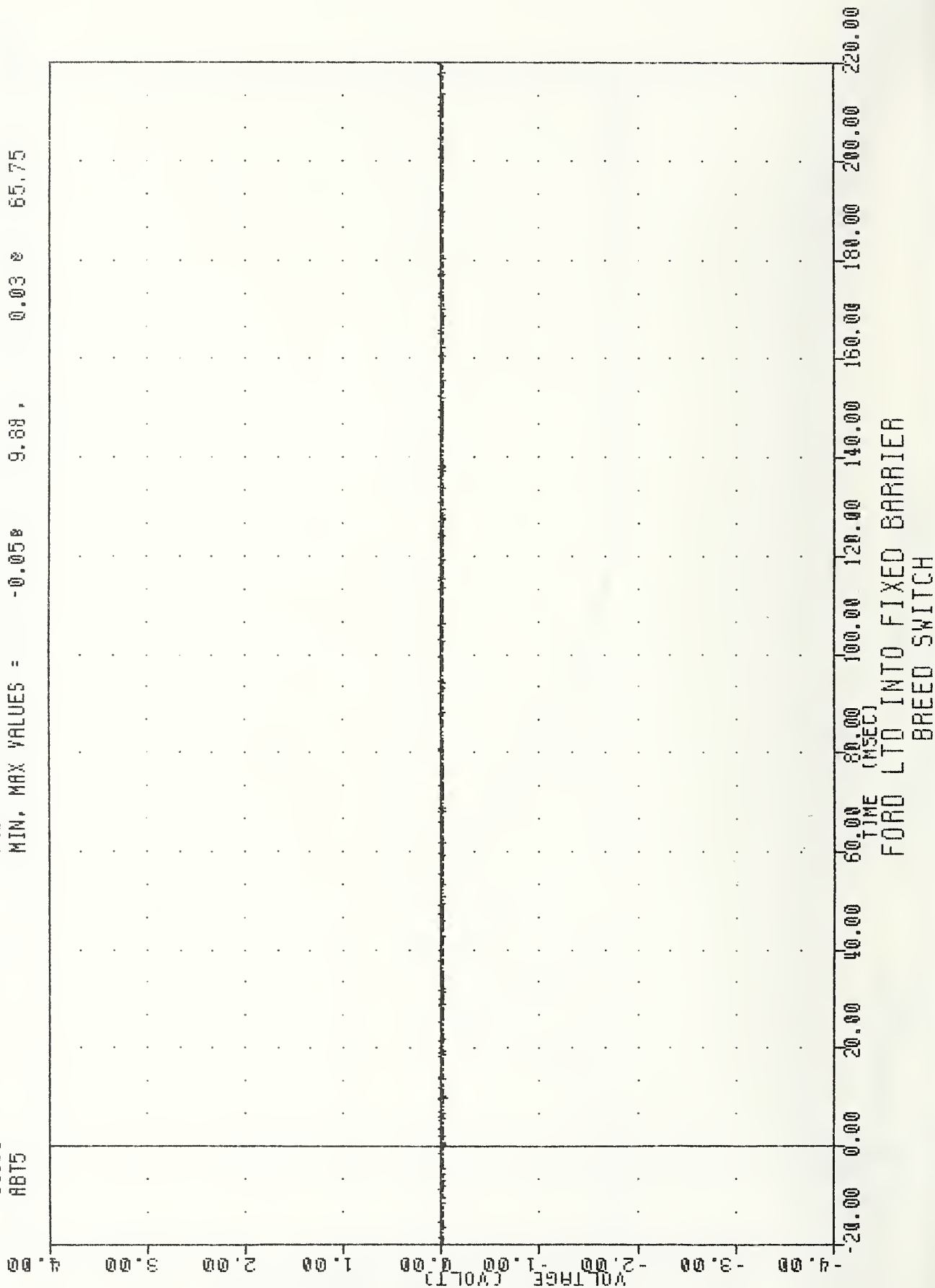
FORD LTD INTO FIXED BARRIER
PILLAR LEFT B ACCELERATION X AXIS

7.1 MPH , 840611
 AIR BAG DEMONSTRATION
 84163
 ABT5

PLOT DATE 13-JUN-84 13:54:54

FILTER = ALPF 1650/ 5214/ -40

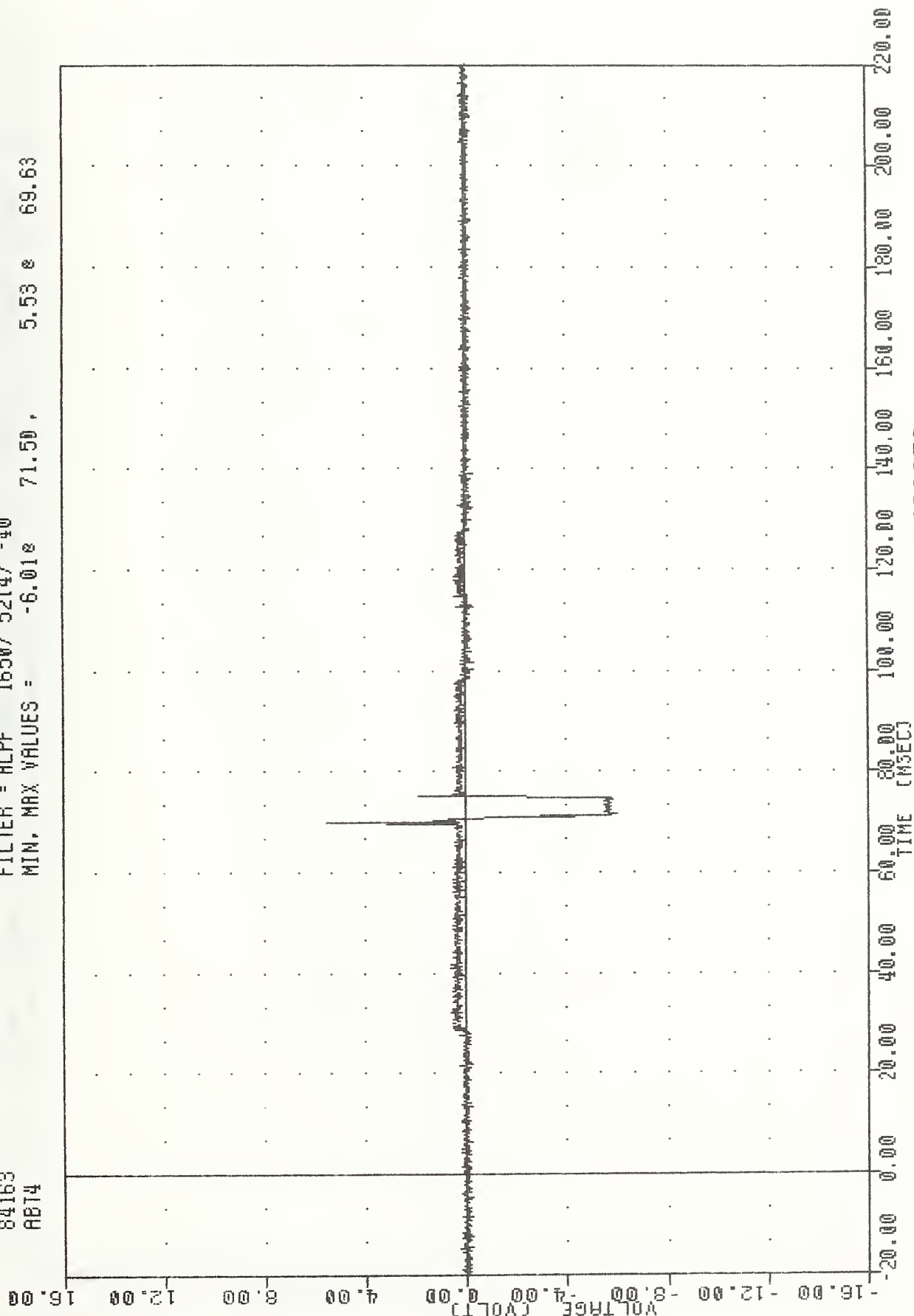
MIN. MAX VALUES = -0.058 9.88 , 0.03 65.75



7.1 MPH
AIR BAG DEMONSTRATION
84163
ABT4

PLOT DATE 13-JUN-84 13:54:54

FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -6.01e 71.50, 5.53 e 69.63



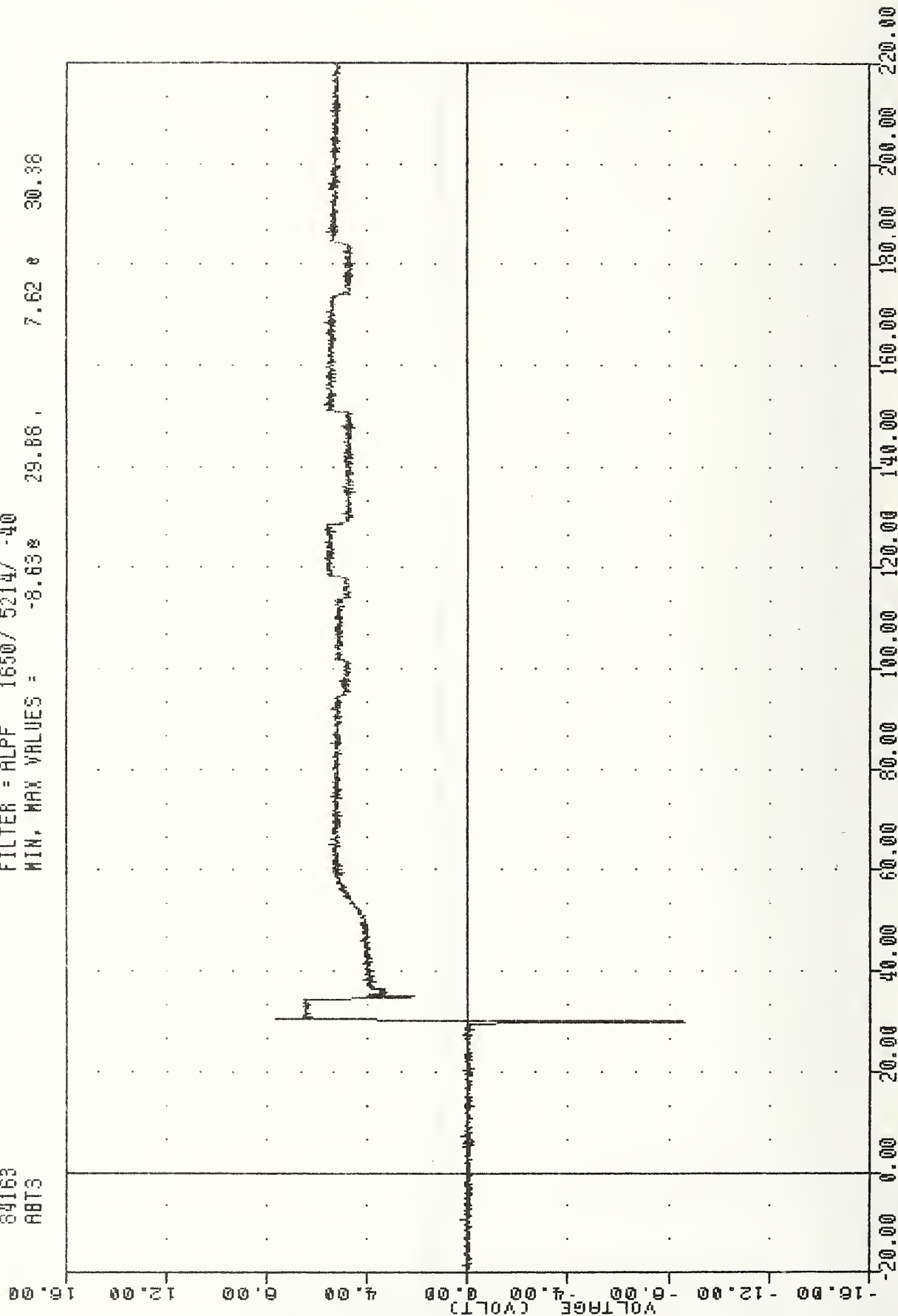
FORD LTD INTO FIXED BARRIER
HIGH LEVEL SW

7.1 MPH , 840611
 AIR BAG DEMONSTRATION
 84163
 ABT3

PLOT DATE 13-JUN-84 13:54:54

FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = -8.638 29.88 , 7.62 8 30.38



FORD LTD INTO FIXED BARRIER
 AIR BAG SAFETY SENSOR

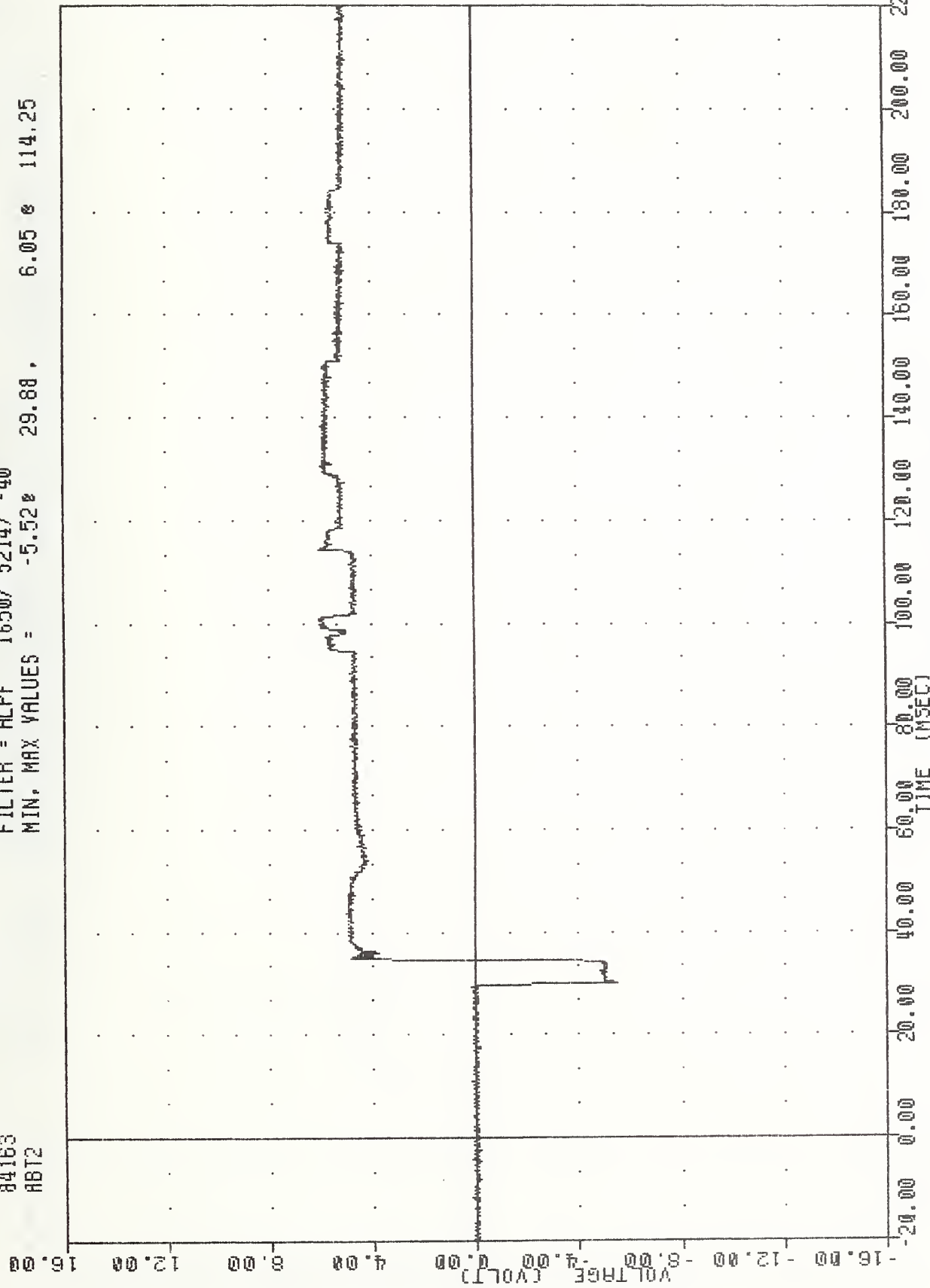
PLOT DATE 13-JUN-84 13:54:54

7.1 MPH , 840611
AIR BAG DEMONSTRATION

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -5.52 29.88 , 6.05 114.25

84163
ABT2



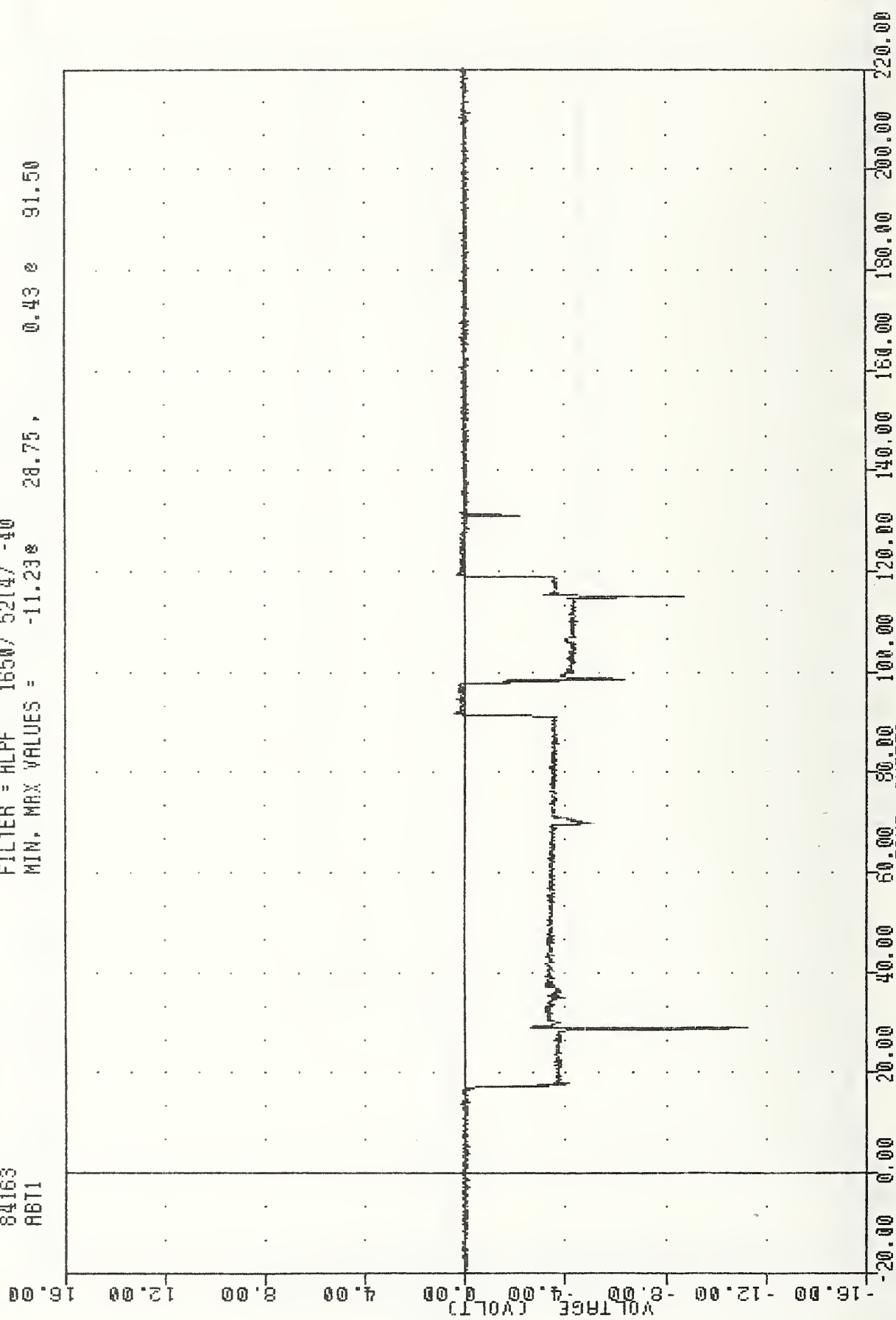
FORD LTD INTO FIXED BARRIER
AIR BAG RIGHT FRONT SENSOR

7.1 MPH , 840611
AIR BAG DEMONSTRATION
84163
ABT1

PLOT DATE 13-JUN-84 13:54:54

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -11.23e 28.75, 0.43 e 91.50

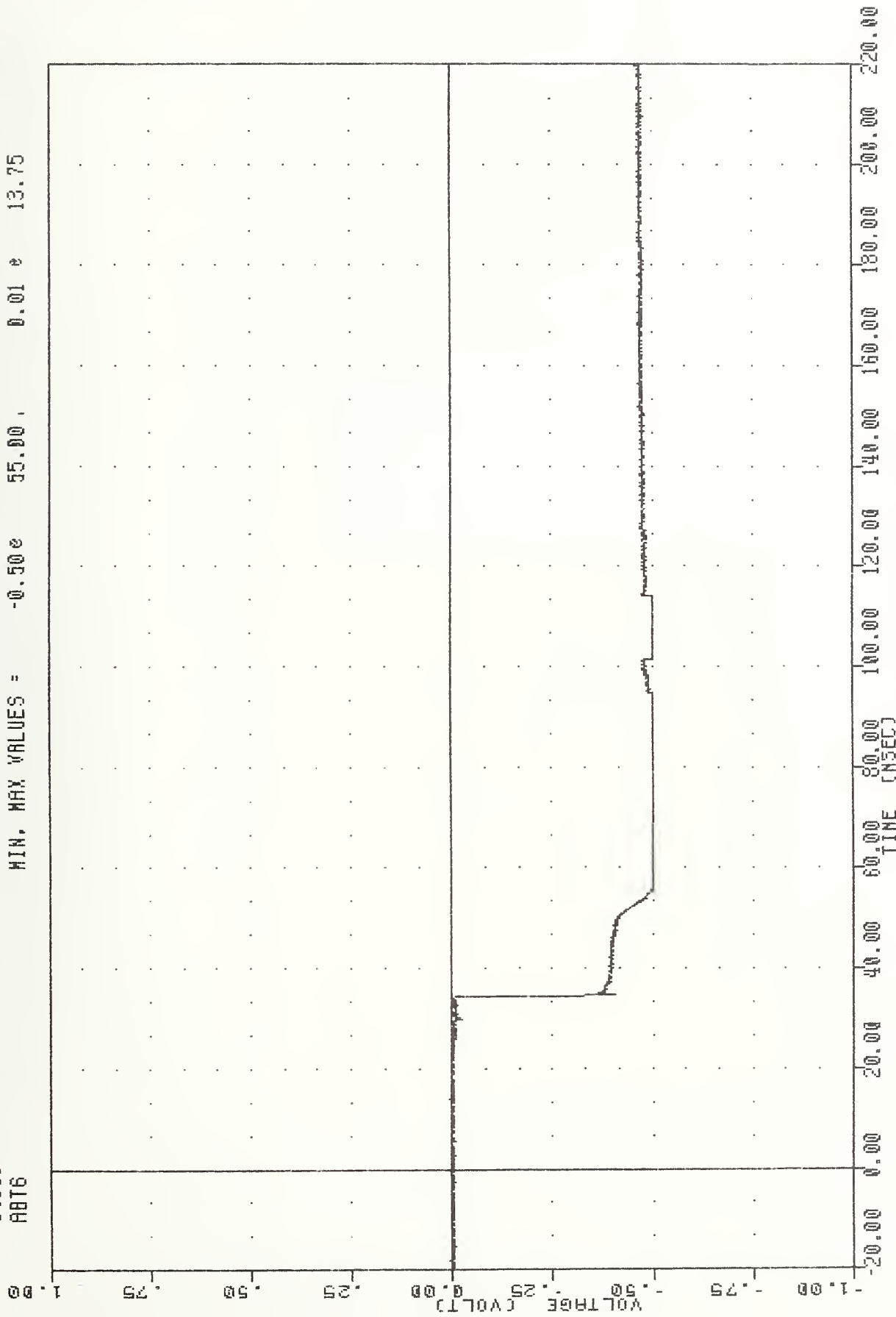


FORD LTD INTO FIXED BARRIER
AIR BAG LEFT FRONT SENSOR

7.1 MPH 840611 13-JUN-84 13:54:54

AIR BAG DEMONSTRATION
84163
ABT6

FILTER = ALPF 1650/ 5214/ -40
MIN. MAX VALUES = -0.50e 55.00 0.01 e 13.75





TL 242 .587

Stultz, J.

Bumper test
LTD retro:

Form DQT F 172
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